

A
PROJECT
FOR
C A N A L S
OF
IRRIGATION AND NAVIGATION
FROM THE
RIVER SOANE
IN
SOUTH BEHAR;
WITH
PLANS AND ESTIMATES.

~~~~~  
BY LIEUT COL C H DICKENS,  
BENGAL ARTILLERY

~~~~~  
Printed by order of the Government of India
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SOANE CANAL PROJECT.



# REPORT OF 1861

## ON THE

### SOANE CANAL PROJECT.

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#### SECTION I. INTRODUCTORY.

THE first step towards the project contained in the following pages was the submission to Government, in 1853, of a Memorandum, printed in the Appendix, on the advantages to be derived from the construction, by Government, of Irrigation Works even in the permanently settled districts\* of the Lieutenant Governorship of

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\* As this paper may possibly fall into the hands of Engineers in England I may as well explain that in the North Western Provinces the Government, as landlord, settles with the village communities once in 20 or 30 years, the amount of the annual rent of the land. When Government Irrigation Works are constructed, a price is fixed for the water, which is comparatively low, and a further profit is looked for from the enhancement of the rent of the land at the next settlement. In most of the districts of the Lieutenant Governorship of Bengal, the rent was settled in perpetuity at the end of the last century. Under that arrangement the total return for the outlay on Irrigation Works must be looked for in the price to be paid by the cultivators for the water. It was a common belief in Bengal that no such price could be obtained as would remunerate the constructors of the works, and hence much of my first report will be found devoted to establish the point that there is no doubt of a good return for the outlay even under the permanent settlement.

In the Madras Presidency there is no separate charge for the water supplied by the Government Irrigation Works, but the Government revenue is assessed at different rates for irrigated and unirrigated lands, and so the profit from Works of Irrigation appears entirely in the enhanced land revenue.

There is another difference between Works of Irrigation constructed in the Madras and Bengal Presidencies which, in order to avoid misapprehension, it may be well to notice here. (See the Index Map of India, Plate I.) The season for rice cultivation throughout India may be considered to be from June to November. The

Bengal, and especially of utilizing in that way the large quantity of water which flows uselessly into the Ganges in the floods of the Kurumnassa and Doorgowtee. I had not then seen the Soane, and had heard no accounts of it to lead me to look to it as a source from which to supply canals with water.

In the end of 1854, I was authorized to proceed to Shahabad and examine the country in detail. I remained there till April 1855, and after my return to Calcutta I submitted the report which will also be found in the Appendix. It will be seen that the quantity of water passing down the Soane in the dry season, and the favourable levels, made that river the main source of supply for irrigation for Shahabad, and suggested the probability of its also being the best source from which to irrigate the part of the District of Behar on its right bank; and the reservoir scheme became of secondary importance.

A detailed survey was ordered in December 1855. I was myself detained on duty in Calcutta, but two Officers—

Captain H. Farrington, 2nd Bengal Fusiliers,  
(since, I regret to say, deceased,)

and Lieutenant H. E. Whish, 26th Bengal Native Infantry,  
(now Executive Engineer, Etawa Division Ganges Canal,)

were placed under my orders to carry on the survey. It was February 1855 before they could get to work, but the survey was carried

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south-west monsoon (which in the open ocean blows nearly due west) sets in early in May, and by the 20th June the air becomes so charged with moisture as to produce the rainy season which continues till September or October. But the monsoon is entirely deprived of moisture by the high lands of the interior before it reaches the Madras Coast, which in the rice-cultivating season is therefore for the most part totally destitute of rain. The rivers however are fed by the monsoon in their upper reaches on the high lands of the interior, and when irrigating canals are established on them, they supply the place of the rains which in the lower lands are absolutely wanting. On the change of the monsoon to the north-east the Madras Coast receives rain in November and December, which is of use to close but not to begin the cultivation.

In the Bengal Presidency the state of the seasons is quite different. The south-west monsoon curves round Cape Comorin and sweeps up the Bay of Bengal nearly as a due south wind. The rainy season sets in with full force in June, and

over the country to the east of the Soane to an extent to prove the practicability of using the water of the river for irrigation on the right as well as on the left bank.

In the end of 1855, I submitted estimates for carrying out a portion of the works on the west of the Soane, but the restrictions which were placed on Public Works expenditure at that time prevented their being sanctioned, and the complete project was awaited.

In June 1856, I was again enabled to visit the districts for a few months, and also in the early part of 1857, but was obliged to return to Calcutta in March. During the dry season of 1856-57 the detailed surveys were proceeded with, both on the right and left banks, to the extent shown in Plate III. The Mutiny took place in May 1857, and it soon became necessary to break up the establishment. Shahabad indeed was amongst the most disturbed districts.

I continued, however, to work up the materials which had been collected for the completion of the project, as my other duties would permit, until December 1860, when I was authorized again to visit the district and devote my whole time to the completion of the project, as far as the data collected would allow.

The project for the Soane Canals has thus been brought to maturity so far as to admit of its being submitted as a whole for the orders of Government.

It is not however by any means complete in detail, nor is it necessary that it should be. It would be a waste of labour to enter into all the details of levels and estimates of a scheme which may not be carried out for years, and which even if begun upon at once, could only be completed gradually, when ample time would

In ordinary seasons the rice can be cultivated without assistance from artificial irrigation. Therefore it must not be expected that the water will ordinarily be paid for in the Bengal Presidency at the same price as in Madras.

The Province of Orissa receives the benefit of the South West monsoon like the rest of the Bengal Presidency (See tract colored yellow on Plate I). The line between the part of the coast which does, and the part which does not receive the benefit of the rains with the South West monsoon is I believe about half way between the mouths of Mahanuddy and Godavary.



be allowed to prepare complete estimates for each branch as they might be wanted. The project now submitted will be found, I believe, as far matured as any similar project has been before receiving the sanction of Government.

One principal point in which detailed information is wanting is the delineation of the local drainage. This has been nearly completed for the portion of the canals south of the Grand Trunk Road—that in fact contained in Plate IV. Some details of information have been collected north of the Trunk Road along the lines of which the levels have been taken, which will be given in their proper place; but a complete survey is wanting, and the lines levelled will need some revision of lining out (as will be apparent by consulting the Sections in Plates V. and VI.), but which the Officers employed were unable to rectify before the mutinies put a stop to their labours. Lieutenant Whish superintended the levels, &c., for the first 14 miles of the Western and for all that was done on the Eastern Soane Canal line. The rest of the work of 1857 is Captain Farrington's. The levels of the lines marked as "of 1861" are my own.

One of the most important points connected with the details of drainage is the direction and amount of the Soane floods which cross the country right and left in the last few miles of the course of the river. It will probably be best only to cross them with small channels for the irrigation, and to let the main navigable canals terminate in the Banās and Poonpoo clear of the floods of the Soane, instead of adopting the lines originally sketched out and levelled.

Another principal point on which details are wanting is as to the sub-soil, especially of the bed of the Soane, where the Dam is proposed to be placed. For this work in the estimate, the foundation is assumed to rest on sand of a very great depth, and it will probably be found to do so for the greater part of the width of the river. For the other works I have allowed an abundant proportion in the estimates to have under-sunk blocks in the foundations. The want of detailed information as to the soil is therefore, I hope, not likely to lead to the estimate being found insufficient.

## SECTION II.—THE SOANE.

This river rises along with the Nerhudda and Mahanuddee on the elevated plateau of Central India near Ummurkuntuk, and runs 325 miles through a high rocky tract, receiving tributaries only from the south. On the north, the drainage area of the river is limited by the steep slopes and precipices of the Kymore range, along which the river runs, and the table-land above which drains away from the Soane to the Ganges. After quitting the elevated rocky region of Central India, the Soane enters the valley of the Ganges, and by a straight course of 100 miles, through the plains of South Behar, joins the sacred river between Arrah and Patna.

It is with this latter portion of the course of the Soane that the present project is concerned. In it the chief peculiarity of the river is its great width. Opposite Tiloohoo (Plate II.) it attains a width of nearly three miles, and for the greater part of the 100 miles it is more than two miles wide. This immense bed consists of sand, and during 8 months of the year contains a stream of only a quarter of a mile wide, so that it appears to the traveller like a sandy desert. The depth of this wide channel is on the average under 20 feet, and in its deepest parts hardly exceeds 30. The strong dry westerly winds, which prevail from January to April and sometimes till June, heap up the sand on many parts of the eastern bank to 12 or 14 feet above the level of the country, with a sharp descent upon it at the angle of repose of the material, thus forming a natural embankment for many miles.

The drainage area of the Soane is (see Plate I.) nearly 23,000 square miles. Its extreme discharge in floods is about  $1\frac{1}{4}$  million cubic feet per second, which, continued for 24 hours, would be equal to a drainage of  $2\frac{1}{4}$  inches from the whole surface in that time. The heavy floods however are of but short duration, hardly ever exceeding four days; and the river even in the rainy season seldom fills its channel. In the dry season the lowest discharge is usually about 4,000 cubic feet per second. It is on this latter discharge that the present project depends.

During the present year the discharge of the Soane has been lower than I have ever known it before. This is the natural effect

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During the present year the discharge of the Soane has been lower than I have ever known it before. This is the natural effect

of the deficiency of rain which produced the famine in the N. W. P. In the end of February the discharge was 3,500 cubic feet per second, and by the end of May it had fallen to 950 cubic feet per second. On the 24th May 1859 it was upwards of 4,000 cubic feet per second.

A discharge of only 950 cubic feet per second in the irrigating season, even if it were only an occasional occurrence, would require a total modification of the present project. But as the irrigating season in Shahabad and Behar terminates in the middle of March, and the river carried 3,500 cubic feet a second up to the end of February, it may be concluded that even in an unusually dry year there will still be an available supply of 3,000 cubic feet a second during the irrigating season.

The object is to throw this supply of water up upon the plains of Behar for the irrigation of the crops, and at the same time to afford a secure and certain means of navigation by canals, instead of the present almost impracticable navigation of the shallow stream that now meanders through the sandy bed of the river in the dry season, or the violent and uncertain flood which rushes down to the Ganges in the rains. The project is therefore principally for constructing artificial rivers like the canals of Northern India, of the Madras Presidency, and of Northern Italy; and only to a comparatively small extent still-water canals, such as are usual in England. The general arrangement proposed may be seen in Plate III.

The facilities which the Soane offers for our purpose are in some respects very great. It receives no tributaries of any considerable size from the point where it enters the plains to the end of its course, and absolutely none from the Trunk Road northwards. There is therefore no very formidable drainage to be crossed by the canals. It has a rapid descent—which is shared by the plains through which it runs—of not less than 2 and generally nearly 3 feet in the mile. There is therefore a complete command of level for the canals in a direction parallel to the river. But further the river (doubtless from having raised the plains by the deposits of its own floods) runs on the crest of the water shed, and so gives a command of level not only parallel but perpendicular to itself, as far as the Doorgowtee and Kurumnassa on the west, and the

Poonpoo on the east This fall of the country, however, though advantageous in kind is excessive in degree, and though it will give great efficiency to the canals as machines for irrigating, it will make them expensive from the number of falls and locks that will be required

Another drawback is the great width of the Soane, which renders the construction of a dam across it a very formidable undertaking

There are further difficulties connected with the floods of the river Although its banks are free from flood for 60 miles of its course, it still inundates the country in places in the last 20 miles of its west and 35 miles of its east banks, and very severely in the last 10 and 25 miles west and east respectively

An interesting subject of inquiry connected with the Soane is the existence of ancient beds of the river in various parts Some of them are apparently not very old, and yet the present banks of the river seem to be remarkably stable One has already been mentioned as extending from Sydabad to near Patna This is mentioned in Dr Francis Buchanan's Report published as "Eastern India" by Montgomery Martin

Another, indicated by a depression, and Soane pebbles in the wells, with a ridge of sand to the east is observable between Shumsherenugur and Wuleedad, and especially at the latter place (50th mile of canal line) Here Lieutenant Whish found traditions of the floods having, within the memory of man, penetrated the country in great bulk and strength The last floods seem to have passed in near Mohummedpoor, at Rampoor Wyna and Umra (north of Wuleedad) and passed out again at Rampoor Wyna The floods extended to Pepra and Budrabad (54th mile of canal line) This is reported not to have occurred for many years

Another old channel is more obscurely indicated from Telcup (the canal head of 1861) on the west bank to the west of Sewahee, it may pass thence east of the Gonyla Hill, and cross the trunk road a mile east of the Kao Possibly it may rejoin the present channel at the depression at Umcaur near Nasreegunj

The following Table gives further details of the width and discharge of the Soane, and explains the cause of the flooding in the lower reaches of the river:—

*Table of the dimensions of the Channel and flood discharge of the Soane River.*

| Number of Stations. | Names of Places. | DISTANCE IN MILES.   |                         | Low water level in feet above the Sea. | Fall per mile in feet = f. | Highest flood rise taken as d. | Mean velocity $v = \frac{10}{16} \sqrt{3fd}$ in feet per second. | Width of river in feet = w. | W d v = discharge in cubic feet per second. |                                                      |
|---------------------|------------------|----------------------|-------------------------|----------------------------------------|----------------------------|--------------------------------|------------------------------------------------------------------|-----------------------------|---------------------------------------------|------------------------------------------------------|
|                     |                  | Below first Station. | Below previous Station. |                                        |                            |                                |                                                                  |                             |                                             |                                                      |
| 1                   | Mouth of Tenta.  | 0                    | 0                       | 492                                    |                            |                                |                                                                  |                             |                                             |                                                      |
| 2                   | Bandoo .. ..     | 13                   | 13                      | 447                                    | 3.3                        | 25                             | 11.0                                                             | 5,921                       | 1,717,000                                   |                                                      |
| 3                   | Teleup ... ..    | 26                   | 13                      | 403                                    | 3.0                        | 18½                            | 9.4                                                              | 9,082                       | 1,688,700                                   |                                                      |
| 4                   | Dehree ... ..    | 43                   | 17                      | 355                                    | 2.7                        | 16                             | 8.4                                                              | 12,875                      | 1,737,400                                   |                                                      |
| 5                   | Doodnugur ..     | 59                   | 16                      | 315                                    | 2.5                        | 10                             | 8.8                                                              | 10,423                      | 1,732,725                                   |                                                      |
| 6                   | Behra .. ..      | 70                   | 11                      | 278½                                   | 3.3                        | 22                             | 10.8                                                             | 7,470                       | 1,771,872                                   |                                                      |
| 7                   | Urwul ... ..     | 81                   | 11                      | 253                                    | 2.3                        | 22                             | 9.1                                                              | 8,504                       | 1,702,501                                   |                                                      |
| 8                   | Mussowra ... ..  | 90                   | 9                       | 234½                                   | 2.0                        | 21                             | 8.2                                                              | 9,820                       | 1,691,004                                   |                                                      |
| 9                   | Koelwar ... ..   | 100                  | 10                      | 207                                    | 1.7                        | 25½*                           | 8.3                                                              | 4,000?                      | 830,000                                     | No Section, but the Railway Bridge gives this width. |
| 10                  | Mouth in Ganges. | 118                  | 12                      | 183                                    |                            |                                |                                                                  |                             |                                             |                                                      |

Assuming that for wide sandy beds like that of the Soane the mean depth in flood (allowing for the motion of the sand) is equal to the flood rise, it thus appears that the extreme flood discharge of the Soane is about 1,700,000 cubic feet per second; and that upon such occasions (of extreme flood) half of the water must be thrown over the country below Mussowra.

### SECTION III.—REMARKS ON CLIMATE.

In their Despatch, copied at page xxxvii. of the Appendices, the late Hon'ble Court remark "that the Provinces of Behar and Benares are the most favored of any portion of India in their ex-

\* The E. I. Railway Engineers have observed no higher rise than 20 feet since 1853, when the Soane Bridge works were commenced.

emption from the calamities of drought on the one hand, and of excessive inundation on the other, and we think therefore that other parts of our territories claim your attention for works of this character more urgently than the Behar Districts."

In this remark of the Court's there seems to be some confusion between the portions of the provinces referred to north and south of the Ganges. North of the Ganges the Court's remark is no doubt just, but to the south the case is very different. Most of the country near the hills is dry and barren, while no tract in India is more subject to severe floods than the country between Patna and Jehanabad, from the lower portion of the Poonpoo eastward. Other parts of the districts also suffer from floods.

It is true that South Behar did not suffer more than a scarcity during the famines of 1837-38 and 1860-61, and that we have no record of the Province having suffered from famine later than the year 1783, on which occasion the Government of that day resolved upon the strange expedient of constructing a series of large granaries as a means of mitigating the severity of such visitations, if not of preventing them. Patna was the place selected for the first granary, and is the only place where one has been erected. It is a bee hive shaped brick building of about 90 feet high with a winding staircase to the top, up which Jung Bahadoor once rode his hilly pony. It is almost needless to say that the building has never been used. I have not been able to trace the steps by which the Resolution of the Government was abandoned. The building bears the following inscription in testimony that Behar is not always exempt from famine —

No 1

IN PART OF A GENERAL PLAN

ORDERED BY THE GOVERNOR GENERAL IN COUNCIL,

20th of January 1781

FOR THE PERPETUAL PREVENTION OF FAMINE

IN THESE PROVINCES,

THIS GRANARY

WAS ERECTED BY CAPTAIN JOHN GARSTIN ENGINEER

completed on the 20th of July 1780

THIS FILLER AND TUBELINE CLOSED BY

(a blank is left on the stone)



But though there is no record of any severe famine in Behar in recent times, there has not unfrequently been distress from scarcity of food. The most severe case of the kind that I have traced occurred in the years 1843 and 1844 from a failure of the rains of 1843. The fall in that year from June to October inclusive was in

|          |     |     |     |     |              |
|----------|-----|-----|-----|-----|--------------|
| Shahabad | ... | ... | ... | ... | 21.3 inches. |
| Behar    | ... | ... | ... | ... | 18.9 "       |
| Patna    | ... | ... | ... | ... | 19.6 "       |

In the previous year Patna had nearly 50 inches. The usual fall in the three districts is about 35 inches in the same period. The Superintendent of the Survey in February 1844 wrote thus:—"A large quantity of land is out of cultivation and cannot, I imagine, be sown now. The crops which are on the ground are also poor, and the unfortunate ryots are in many places in a wretched state. I saw some 20 individuals near Bheeta [Behta], opposite to Daoodnugger, where the crops are certainly not the worst, picking up the grain that had fallen in cutting the crops, kernel by kernel, for a subsistence." There was in fact an almost total failure of the rice crop followed by a bad cold weather crop. It was only a seasonable fall of rain in February that prevented the failure of the cold season crop also. The district rice had totally disappeared from the markets, and was replaced at a higher cost by rice from Bengal proper.

It is true that irrigation is not so much wanted in South Behar as on the east coast of the Madras Presidency, where the rains are totally wanting at the season for cultivating rice. It is also true that irrigation is not so much required in South Behar as in the Punjab and N. W. Provinces where the rains are more scanty and irregular. But it is not the less certain that irrigation is much wanted in South Behar, and that there exist means of affording it which many other provinces do not possess.

I do not imagine however that the late Court of Directors intended to discourage the establishment of irrigation canals in Shahabad and Behar, merely because there are other parts of India (often not possessing the means of constructing such works) which are more subject to drought. It was only to guard against the possibility of such other districts being overlooked that it was

desired by the Court to have a complete review (as since established in the Budget System) of the wants and means of supplying the wants of all the territories, before sanctioning the outlay of any large sums upon such works

#### SECTION IV—SITUATION OF THE HEAD OF SUPPLY

The choice of a position for the Dam and Head works is the first point to be considered in establishing the canals. At first after examining in detail only the west side of the Soane, I was disposed to adopt the narrow part of the river between Badoo and Khabra, just below the junction of the Koel (See Section in Plate IV). The Dam would have been shorter there than anywhere else, and there would have been an ample command of level. The numerous small drainage channels on the west, with the Hoosenee river and Teleup nala, could be passed without much difficulty. But there were three objections which proved stronger than the advantages of a short Dam and a good command of level. *First*, the junction of the Koel, and narrowness of the Soane at Badoo produce a very high flood rise compared with what takes place on other parts of this river—about 26 or 27 feet above the low water. *Second*, the streams to be crossed on the left bank between Khabra and Putthurghatta are numerous and formidable. *Third*, there is a great deal of rocky soil between Deoree and Boodhwa, and again between Putthurghatta and Dhoondhoo. The extremely heavy rock-cutting near Deoree might have been avoided by taking the canal along a low ledge of rocks close to the Soane bank, walling it off from the floods, as was suggested by Lieutenant Whish, but on the whole these three objections were sufficient to induce me to abandon the idea of forming the head at Badoo. To these may also be added the objection which occurred to Sir A. Cotton, that the small area of irrigation which would be obtained by the additional command of level would not meet the additional cost of the increased length of the canal.

My choice has therefore now fallen upon a site between Teleup and Jhikuttee for the Dam and Head-works. The river here is narrower than at any other place between Badoo and the Grand Trunk Road, being 2,682 feet wide. There is abundance of rock

within a short distance on both sides of the Soane to afford the materials for the construction of the dam, and all the formidable drainage on the east with a great deal of that on the west is avoided. In fact, the site near Badoo being abandoned, there is scarcely any other site open to selection than the one in the neighbourhood of Putthurghatta.

A Sketch Survey of the ground, with lines of levels plotted thereon, and a Section of the river, will be found in Plate VII.

The site however has its inconveniences. On the west side the land on the river bank is below flood level by perhaps  $6\frac{1}{2}$  feet on the edge of the bank, and the water reaches to a distance of upwards of 1,000 yards in land. The soil is apparently a moderately stiff clay as far down the bank as can be seen,—about 2 feet below the low water level. But I fear this stratum will not be found to extend further; for a well near the Abkaree (see Plate VII.), of 25 feet deep, reaches the sand and shingle of the Soane. The level of the ground there is about 373 feet above the datum of the levels, which brings the level of the water to about the level of the Soane. There seems to be no doubt therefore that on the west side we shall have to under-sink the foundations of the Head-works.

The bank does suffer to some extent from erosion by the Soane. I saw masses of the clay that had fallen into the river below the bank, and was told by the villagers that it sometimes fell in when a strong east wind occurred simultaneously with a high flood. The erosion must however be very small, as I could detect no unmistakeable difference between the position of the bank in the plot of our levelling operations on a scale of 4 miles to an inch compared with the Revenue Survey Village maps constructed on the same scale in 1846. It will be necessary however to provide some protection for the bank under the increased scour which will be caused by the canal Dam.

On the east side the inconvenience is of precisely the reverse kind. It consists in the existence of rock, and the possibility of having to excavate the canal channel in rock for a distance of about 4,000 feet. The excavation however will furnish part of the material for the Dam across the Soane, and will therefore be rather a source of inconvenience than of expense. It is impossible to say

what extent of rock-cutting will be necessary until the ground is opened. No trace of the rock is seen upon the surface in the line selected for the canal after crossing the Dhoondhooa nala; nor indeed for some hundreds of feet before coming to it—the last out-crop of rock is nearer the Soane as marked on the Survey, Plate VII.

#### SECTION V.—GENERAL PLAN OF THE CANALS.

The general plan of the Soane Canals now proposed is much the same as I proposed in 1855, but with the addition of canals on the east of the Soane for the irrigation of a portion of the Behar and Patna Districts. The main features of the proposal are the fan-like spread of irrigation channels from 10 or 12 miles below the Head-works all over the country right and left of the Soane as far as the Kurumnassa and Ganges on the west and north, and the Morhur and Poonpoon on the east; and the provision of four main lines of navigation, to Benares, to the mouth of the Kurumnassa, to Arrah and to Patna. It is not intended that all these should be constructed at first, nor, perhaps, at all. But it is desirable to estimate for all, in order to facilitate selection. The details of the scheme will best be gathered from Plate III. and the following Tables:—

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Table of the Western Soane Canal and its Branches.

| SUPPLY OF WATER REQUIRED.                                      |                                                                                                                             |                        |     | CHANNEL.                     |                                                  |                                    |                  |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------|-----|------------------------------|--------------------------------------------------|------------------------------------|------------------|
| Irrigation.                                                    |                                                                                                                             |                        |     | Total cubic feet per second. | Supply to other branches. Cubic feet per second. | Navigation. Cubic feet per second. | Length in miles. |
| Areas.                                                         | Square Miles.                                                                                                               | Cubic feet per second. |     |                              |                                                  |                                    |                  |
| A Main Canal ... ..                                            | 15                                                                                                                          | 12                     | ... | 1,980                        | B + L = 1,968                                    | ...                                | 10 $\frac{1}{2}$ |
| B Arrah Branch above Ranipoor branch head ... ..               | $\frac{10 \times 3}{2}$                                                                                                     | 111                    | ... | 877                          | C + J = 766                                      | ...                                | 22               |
| C Ditto below ditto and above the Peeroo branch head ... ..    | $(3 \times 2 + 16 \times 5 + 21 \times 10) \times \frac{1}{3}$                                                              | 27                     | ... | 576                          | D + G = 549                                      | ...                                | 7                |
| D Ditto below Peeroo and above the Nansagor branch head ... .. | $7 \times 5$                                                                                                                | 47                     | ... | 385                          | E + F = 288                                      | ...                                | 15 $\frac{1}{2}$ |
| E Ditto to terminus ... ..                                     | $16\frac{1}{2} \times 7\frac{1}{2} \times \frac{1}{3}$                                                                      | 93                     | 150 | 243                          | .....                                            | ...                                | 20 $\frac{1}{2}$ |
| F Nansagor branch ... ..                                       | $17 \times 7\frac{1}{4}$                                                                                                    | 45                     | ... | 45                           | .....                                            | ...                                | 22 $\frac{1}{2}$ |
| G Peeroo branch above Jugdispoor branch head ... ..            | $17 \times 3\frac{1}{2}$                                                                                                    | 57                     | ... | 214                          | H + I = 157                                      | ...                                | 11 $\frac{1}{2}$ |
| H Ditto below ditto ... ..                                     | $\frac{1}{2}(14 \times 6\frac{1}{2} + 10\frac{1}{2} \times 3\frac{1}{2}) + 6\frac{1}{2} + 4\frac{1}{2} \times 2\frac{1}{2}$ | 84                     | ... | 84                           | .....                                            | ...                                | 17 $\frac{1}{2}$ |
| I Jugdispoor branch ... ..                                     | $110$                                                                                                                       | 73                     | ... | 73                           | .....                                            | ...                                | 17               |
|                                                                | $15 \times 6\frac{1}{2}$                                                                                                    |                        |     |                              |                                                  |                                    |                  |





Table of the Eastern Soane Canal and its Branches.

| Distinguishing letters. | Name of Branches.                                       | SUPPLY OF WATER REQUIRED. CUBIC FEET PER SECOND.                           |                 |                       |             |                     | CHANNEL. |                          |                         |                               |                  |
|-------------------------|---------------------------------------------------------|----------------------------------------------------------------------------|-----------------|-----------------------|-------------|---------------------|----------|--------------------------|-------------------------|-------------------------------|------------------|
|                         |                                                         | Irrigation.                                                                |                 |                       | Navigation. | For other branches. | Total.   | Width at bottom in feet. | Depth of water in feet. | Fall of bed in feet per Mile. | Length in Miles. |
|                         |                                                         | Areas.                                                                     | Square Miles.   | Cubic feet per second |             |                     |          |                          |                         |                               |                  |
|                         |                                                         |                                                                            |                 |                       |             |                     |          |                          |                         |                               |                  |
| a                       | Main Canal                                              | $(5 \times 3) \times \frac{1}{2}$                                          | 7 $\frac{1}{2}$ | 6                     | ...         | b + k = 1,138       | 1,144    | 52                       | 6 $\frac{1}{2}$         | 0.94                          | 12               |
| b                       | Patna branch above Jakhovra branch head                 | $\frac{1}{2} (11 \times 6)$                                                | 33              | 25                    | ...         | c + g = 713         | 738      | 38 $\frac{1}{2}$         | 5 $\frac{1}{2}$         | 1.11                          | 8                |
| c                       | Ditto below ditto and above Kojhassa branch head        | $\frac{1}{2} (15\frac{1}{2} \times 2\frac{1}{2} + 15\frac{1}{2} \times 7)$ | 74              | 55                    | ...         | d + h = 604         | 659      | 34 $\frac{1}{2}$         | 4 $\frac{1}{2}$         | 1.18                          | 14.              |
| d                       | Ditto below Kojhassa and above Paleegunj branch head... | $11 \times 3\frac{1}{2} + \frac{1}{2} (23\frac{1}{2} \times 9)$            | 144             | 108                   | ..          | e + i = 424         | 532      | 29 $\frac{1}{2}$         | 4 $\frac{1}{2}$         | 1.25                          | 27               |
| e                       | Ditto below Paleegunj and above Dinapoor branch head    | $9 \times 5$                                                               | 45              | 33                    | ...         | f + j = 358         | 391      | 26                       | 4                       | 1.40                          | 9 $\frac{1}{2}$  |
| f                       | Ditto to terminus                                       | $25 \times 4\frac{1}{2}$                                                   | 112             | 84                    | 150         | .....               | 234      | 18                       | 3 $\frac{1}{2}$         | 1.78                          | 27               |
| g                       | Jakhovra branch                                         | $16\frac{1}{2} \times 3\frac{1}{2} + \frac{1}{2} (4\frac{1}{2} \times 4)$  | 71              | 54                    | ...         | .....               | 54       | 6                        | 2                       | 2.00                          | 24 $\frac{1}{2}$ |
| h                       | Kojhassa branch                                         | $78 \times 4\frac{1}{2} + (7 \times 4\frac{1}{2}) \frac{1}{2}$             | 97              | 72                    | ...         | .....               | 72       | 10 $\frac{1}{2}$         | 2 $\frac{1}{2}$         | 2.00                          | 27               |
| i                       | Paleegunj branch                                        | $9 \times 5$                                                               | 45              | 33                    | ...         | .....               | 33       | 7                        | 1 $\frac{1}{2}$         | 2.00                          | 14               |

|   |                                                         | $\frac{1}{2} (61 \times 8 + 26 \times 41)$                                                          | 165   | 124 |  |  |  | 124 | 21 | 14 | 21 | 200 | 20  |
|---|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------|-----|--|--|--|-----|----|----|----|-----|-----|
| j | Dunspoor branch                                         |                                                                                                     |       |     |  |  |  |     |    |    |    |     |     |
| k | Tharee branch above Jammoor branch head                 | $2\frac{1}{2} \times 4\frac{1}{2} + 1 \times 9 \times 2\frac{1}{2} + 4 \times 4 \times \frac{1}{2}$ | 30    | 21  |  |  |  |     |    |    |    | 140 | 10  |
| l | Ditto below Jammoor and above Khurona branch head       | $2\frac{1}{2} \times 3\frac{1}{2} \times \frac{1}{2}$                                               | 41    | 3   |  |  |  |     |    |    |    | 151 | 5   |
| m | Ditto below Khurona and above Achore branch head        | $11 \times 3\frac{1}{2} \times \frac{1}{2}$                                                         | 18    | 13  |  |  |  |     |    |    |    | 161 | 11  |
| n | Ditto below Achore and above Dadur branch head          | $4\frac{1}{2} \times 4 \times \frac{1}{2}$                                                          | 9     | 7   |  |  |  |     |    |    |    | 171 | 8   |
| o | Ditto below Dadur and above Hameednugger branch head    | $8\frac{1}{2} \times 6\frac{1}{2} \times \frac{1}{2}$                                               | 271   | 21  |  |  |  |     |    |    |    | 181 | 5   |
| p | Ditto below Hameednugger and above Kutangee branch head | $3 \times 3 + 3 + 2$                                                                                | 11    | 12  |  |  |  |     |    |    |    | 200 | 4   |
| q | Ditto to terminus                                       | $17 \times 5$                                                                                       | 85    | 61  |  |  |  |     |    |    |    | 200 | 24  |
| r | Jammoor branch                                          | $6 \times 3\frac{1}{2}$                                                                             | 21    | 15  |  |  |  |     |    |    |    | 200 | 61  |
| s | Khurona branch                                          | $9\frac{1}{2} \times 8 + 10\frac{1}{2} \times 3\frac{1}{2} \times \frac{1}{2}$                      | 941   | 71  |  |  |  |     |    |    |    | 200 | 16  |
| t | Achore branch                                           | $5 \times 4$                                                                                        | 20    | 15  |  |  |  |     |    |    |    | 200 | 51  |
| u | Dadur branch                                            | $\frac{1}{2} (8\frac{1}{2} \times 9 + 4\frac{1}{2} \times 2\frac{1}{2})$                            | 41    | 33  |  |  |  |     |    |    |    | 200 | 12  |
| v | Hameednugger branch                                     | $15\frac{1}{2} \times 11 \times \frac{1}{2}$                                                        | 85    | 61  |  |  |  |     |    |    |    | 200 | 101 |
| w | Kutangee branch                                         | $17 \times 4\frac{1}{2}$                                                                            | 761   | 58  |  |  |  |     |    |    |    | 200 | 15  |
|   |                                                         |                                                                                                     |       |     |  |  |  |     |    |    |    |     |     |
|   |                                                         | Total                                                                                               | 13001 |     |  |  |  |     |    |    |    |     | 320 |

*Table of the Lines of Canal for Navigation only, which may be added to the foregoing.*

| Names of Canals.                                                              | Length in Miles. | Width at bottom in feet. | Depth of water in feet. | Fall of bed per mile. | Discharge in cubic feet per second. | REMARKS.                                                                                                                                         |
|-------------------------------------------------------------------------------|------------------|--------------------------|-------------------------|-----------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                               |                  |                          |                         |                       |                                     |                                                                                                                                                  |
| I. Navigable Canal parallel to the last portion of Patna Branch ...           | 27               | 20                       | 3½                      | 1 inch ...            | 63                                  | The discharges of these canals will probably not exceed one-half of what is set down as the theoretical discharge, owing to growth of weeds, &c. |
| II. Navigable Canal parallel to the last portion of the Arrah Branch ...      | 20               | 20                       | 3½                      | 1 inch ...            | 63                                  |                                                                                                                                                  |
| III. Navigable Canal parallel to the last portion of the Chouwa Branch ...    | 27               | 20                       | 3½                      | 1 inch ...            | 63                                  |                                                                                                                                                  |
| IV. Navigable Canal parallel to the second portion of the Sasseram Branch ... | 15               | 20                       | 3½                      | 1 inch ...            | 63                                  |                                                                                                                                                  |
| V. Main Navigable Line to the Ganges, nearly opposite Benares ...             | 56               | 25                       | 5                       | 4 inches..            | 247                                 |                                                                                                                                                  |
| Total ...                                                                     | 145              |                          |                         |                       |                                     |                                                                                                                                                  |

The total length of the Canals is thus—

|                                     |           |
|-------------------------------------|-----------|
| Western Soane Canals for Irrigation | 361 Miles |
| Eastern ditto ditto                 | 320 "     |
|                                     | <hr/>     |
| Total                               | 681 Miles |
| Add Canals for Navigation only      | 145 "     |
|                                     | <hr/>     |
| Grand Total                         | 826 Miles |
|                                     | <hr/>     |

The total discharge is—

|                |                             |
|----------------|-----------------------------|
| Western Canals | 1,980 cubic feet per second |
| Eastern ditto  | 1,144 " "                   |
|                | <hr/>                       |
| Total          | 3,124 cubic feet per second |
|                | <hr/>                       |

of which 600 cubic feet per second is reserved for navigation and 2,624 cubic feet per second proposed to be expended in irrigation

It will be observed in the foregoing Tables that I have calculated the requirements of the districts for irrigation at  $\frac{2}{3}$  lbs of a cubic foot of water per second for every square mile of gross area. This is rather a larger allowance than I calculated upon in para 21 of my Report of 1855, where I mentioned  $\frac{1}{3}$  lbs of a cubic foot per square mile of gross area as probably a sufficient provision of water. Sir Proby Cautley allows 8 cubic feet to each mile of canal. If the canal be supposed to irrigate 1, 5 or 6 miles on each side, this gives 1,  $\frac{2}{3}$  lbs or  $\frac{1}{3}$  lbs of a cubic foot per square mile of gross area. I believe the allowance I have made will be found sufficient, and not greater than the cultivation will require.

It will further be observed that the slope of bed given to the canals is, for the larger lines, much less than it has been usual to allow in Northern India. I have in fact adopted a fixed velocity instead of a fixed slope of bed. The slope of bed is calculated to give the velocity of about 3 feet per second (2 miles an hour) with side slopes of  $1\frac{1}{2}$  to 1, and a width on floor equal to the depth plus one squared, in feet, and from these data and the required discharge, the dimensions of the channels are calculated. I have used the

formula of Eytelwein as given in Young's Tracts on Hydraulics, in these calculations, viz.:—

$$v = 1.49 \sqrt{2 f d}.$$

where

$v$  = velocity per second in feet.

$f$  = fall of bed per mile in feet.

$d$  = the hydraulic mean depth in feet.

For the navigable lines—that is, for the lines of canal where water is required for navigation in excess of what is passing down the canal for irrigation—I have allowed in each case 150 cubic feet per second. It will be observed that there are four such lines included in the Tables of irrigating canals. These, with the fall and velocity allowed, only have a width of  $18\frac{1}{2}$  feet at bottom and about 28 feet on the water line, and a depth of  $3\frac{1}{4}$  feet of water. This size, though larger than that of many of the English canals for navigation, is undoubtedly small for a canal of any considerable traffic. This width and depth moreover is liable to be drawn upon for the irrigation to such an extent as might leave the width at water line  $26\frac{1}{2}$  and the depth  $2\frac{3}{4}$  feet. The dimensions laid down by the French for a canal of “Petite Navigation” are 33.3 feet wide at the water line and 22 feet on the floor, with a depth of 5 feet of water. The depth is not necessary with an abundant supply of water, such as is given by the proximity of the irrigating canal, and the dimensions of my channels in other respects nearly reach those of the canals of Petite Navigation, which are larger than many English canals. Still I think these channels alone will not suffice for the traffic likely to be developed on the Soane Canals, and I have added in lines parallel, still-water canals of 20 feet width at bottom and  $3\frac{1}{2}$  feet deep, to take what would otherwise be the up-stream traffic of the flowing canals, whenever the latter are less in width than 22 feet on the floor.

For the navigable line to Benares, where the canal is a still-water one only, without a parallel running stream, I have allowed a width of 25 feet on the floor and 40 on the water line with 5 feet depth of water. This canal will be 56 miles long. Allowing

a waste of as much as 12 inches of surface per diem, and a loss of double the contents of the locks for the passage of each lock of boats, and supposing 50 locks full to pass daily, the supply required will be 137 cubic feet per second for the former, and 29 for the latter, or 166 cubic feet per second in all. The canal must have a slight slope, about 2 inches per mile, to carry the supply forward, and this will save some expense in locks, but it will be better to allow 4 inches, to make up for periods of low water, and the obstruction arising from the growth of weeds, &c. The flow can always be regulated by the stop boards of the waste channels of the locks. Mills may be established at the locks on the upper part of this canal without any danger of want of water for working them, and the locks (except for the descent into the Ganges) will all be on the upper part. I have only allowed 150 cubic feet per second for this canal, and the short line parallel to the navigable portion of the Sasseram branch, but this will, I think, fully suffice, considering that the Main Navigable line will have the benefit of the tail waters of the irrigation when not in full use. There would be no difficulty, however, in increasing the supply to any extent that is likely to be required. It would make no appreciable difference in the capacity of the large upper channels of the flowing canal.

In the flowing canals an escape is allowed at every bifurcation, and in some instances when the lines are long, at intermediate points. The dimensions of the channels are intended to be preserved without change until the occurrence of an escape gives the means of altering them without risk of inconvenience from surplus water.

With so great a variety of size of channel it would be a most laborious business to give estimates and designs in detail for bridges and other works exactly suited to each individual channel, and it would also probably be, after all, of no use, for it is hardly likely that the sizes of channels will be exactly adhered to when the works come to be laid out on the ground. What is now laid down represents the scheme as a whole and in its main features correctly, but it must be open to modification in detail to suit the facts that will be brought out in the detailed examination of the country that has yet to be undertaken.

I have therefore divided the channels into classes as follows :—

| Class. |      | Range of widths<br>of canals at<br>bottom. | Range of depths<br>of water. | Range of dis-<br>charges. | Range of fall<br>per mile. |
|--------|------|--------------------------------------------|------------------------------|---------------------------|----------------------------|
|        |      | Feet.                                      | Feet.                        | Cubic feet per<br>second. |                            |
| I      | ...  | 73                                         | 7.5                          | 1,980                     | 0.75                       |
| II     | ..   | 52—49                                      | 6½—6                         | 1,144—1,091               | 0.94—1.00                  |
| III    | ...  | 42½—37                                     | 5½—5¼                        | 877—738                   | 1.04—1.11                  |
| IV     | ...  | 31½—29½                                    | 4½—4¼                        | 669—532                   | 1.18—1.25                  |
| V      | ...  | 26—23                                      | 4¼—3¾                        | 400—335                   | 1.40—1.54                  |
| VI     | ...  | 21—17                                      | 3.6—3.1                      | 314—214                   | 1.60—1.80                  |
| VII    | ...  | 16—12½                                     | 3—2.6                        | 190—106                   | 1.90—2.00                  |
| VIII   | ...  | 11—9½                                      | 2.3—2.25                     | 81—64                     | 2.00                       |
| IX     | ...  | 9—7                                        | 2—1.66                       | 51—33                     | 2.00                       |
| X      | .... | 5—                                         | 1.25                         | 15                        | 2.00                       |

The estimates for bridges and for the land to be taken up are made out for these classes, see Plates XVII. and XX. For the other works, designs have been drawn up only for some of the classes of channels, and the cost of the works for the others deduced from these, as will be observed when I come to speak of the several works.

One general remark must however be made here. I have drawn nearly all the designs for works with undersunk blocks in their foundations. This is not done with the idea that such foundations will be always, or even to any large extent required, but to enable me to show in the estimates what is likely to be the outside cost of each description of work. In the general estimates of the cost of the canals, I have assumed that half the works will require such foundations. This is a very liberal allowance, and more than covers any probable excess in actual cost over estimate arising from the soil being found unfavorable when the works are put in hand.

#### SECTION VI.—LAND, FENCING, ROADS, PLANTATIONS AND EXCAVATION.

Plate XX. shows the width of land to be taken up for each class of channel, for the canal and banks. The sections on which these widths are taken give more than the average depths of cutting, and by taking a little less where the cutting is light, and more where it is heavy, I think the widths of land will be ample.

These widths give the following areas —

Deep cutting, West Main Canal, 600 feet wide, or 80 acres = 128 beegahs per mile, which at Rs 6 per beegah (3,025 square yards), and with 10 per cent added comes to Rs 845 per mile

Deep cutting, East Main Canal, 600 feet wide, or 72½ acres = 116½ beegahs per mile, which at Rs 6 per beegah, and with 10 per cent added, comes to Rs 768 per mile

Ordinary 1st Class Channel, Western Main Canal, 410 feet wide, or 53½ acres = 85½ beegahs per mile, which, as above, comes to Rs 563 per mile

Channels, II<sup>nd</sup> Class, 330 feet wide, or 40 acres = 64 beegahs per mile, which, as above, comes to Rs 422 per mile

Channels, III<sup>rd</sup> Class, the same

Channels, IV<sup>th</sup> Class, 220 feet wide, or 26½ acres = 42½ beegahs per mile, which, as above, comes to Rs 282 per mile

Channels, V<sup>th</sup> Class, 200 feet wide, or 21 acres = 38½ beegahs per mile, which, as above, comes to Rs 255

Channels, VI<sup>th</sup> Class, 180 feet wide, or nearly 22 acres = 35 beegahs per mile, which, with 10 per cent added, comes to Rs 231 per mile

Channels, VII<sup>th</sup> Class, 150 feet wide, or 18½ acres = 29 beegahs per mile, which, with 10 per cent added, comes to Rs 192 per mile

Channels, VIII<sup>th</sup> Class, 130 feet wide, or 14½ acres = 25½ beegahs per mile, which, with 10 per cent added, comes to Rs 166 per mile

Channels, IX<sup>th</sup> Class, 100 feet wide, or 12 acres = 19½ beegahs per mile, which, with 10 per cent added, comes to Rs 127½ per mile

Channels, X<sup>th</sup> Class, 80 feet wide, or 9½ acres = 15½ beegahs per mile, which, with 10 per cent added, comes to Rs 102 per mile.

Besides these spaces for the channel there will be required extra land for workshops and residences for the Canal Engineers and Subordinates, and for the Station Houses or Chokees, and for



the space between the lock channel and main canals in cases where the locks are placed on separate channels. This latter item will amount to 120 acres or 192 beegahs for each lock channel costing Rs. 1,152.

For residences for Engineers, Subordinates, and work-people, Workshops, quarries, and roads, a great deal of land will be required at the Canal Heads on both sides. There is abundance of uncultivated high open ground, and I think it would be best to take up at once an ample space, say of 300 acres (480 beegahs) on the west, and 200 (320 beegahs) on the east side of the Soane. The land would probably cost much less than the rate of Rs. 6 a beegah, which I have set it down at, agreeably to the average rate deduced in para. 53 of the Report of 1855 (Appendix A, page xxxii).

I propose also to allow smaller plots of ground for similar purposes at the places where the Head Quarters of Executive Engineers of Divisions are likely to be. These will probably be four in number, one for each of the main branches of the canals—possibly at Bullea or Behta for the Arrah branch, at Kurroundea for the Sasseram branch, at Daoodnuggur or Urwal for the Patna branch, and at the crossing of the Bootana for the Tikaree branch. I include 20 acres (32 beegahs) for this purpose in the estimates for the main trunks of each of these branches.

For the other purposes mentioned, the addition of 10 per cent. to the extent of land required for the canal and banks will suffice.

After possession of the land has been obtained, the first thing to be done will be to mark the boundaries by ditches, and to form roads of communication along the whole extent. Sums for this purpose are included in the Baree Doab Canal estimate, but none appear in that of the Ganges Canal. In Shahabad and Behar there is a great deficiency of good district roads, and the communication across country, during the rains, and even at other periods, is by no means easy. It will be a necessity to form the communication, and it is better to have it expressly provided for in the estimate than to charge it to excavation. The work will consist of removing jungle and obstacles, moderate raising here and there, temporary bridges, and the application of sand, and here and there a little metal to very bad swampy soils. I allow Rs. 400

a mile of the Main Canals, East and West, and of the Sasseram branch upper, Rs. 250 a mile to the other channels down to Class VI. inclusive, and Rs 150 a mile for the rest

As all the spoil banks and other spare land will be planted with trees, it will be necessary to commence nurseries of useful kinds of trees as soon as the land is taken up, and the cost of these nurseries must be provided for in the estimate for construction until the canal lines are brought into use, when this maintenance will fall naturally upon the working expenses. The estimates for the Baree Doab Canal lead me to think that a charge of one rupee per beegah of the land occupied will be a sufficient provision for the formation of nurseries, which will thus be an addition to the expense equal to one sixth of the cost of the land. Care must of course be taken to select useful trees. The Mango and Sissoo should form the principal part of the plantations.

On the subject of the excavations I need say nothing in addition to the note to the Estimate No 1 in the Appendix, except that no part of the light excavation should be begun till the deep cutting work is well advanced. To proceed otherwise would be to charge the works with interest on the outlay at an unnecessarily early period. It is also to be noted that the passage of the drainage from the roads and local depressions through the high banks of the deep cutting is intended to be by intervals left in the banks, and not by masonry drains. The drainage on the up stream side (when the canal crosses the drainage) should be conducted along the side of the spoil bank and passed into the inlets or other works intended for the reception of the main drainage of the country.

#### SECTION VII.—ACCOMMODATION FOR ENGINEERS AND SUBORDINATES, WORKSHOPS, &c

In the estimate for this project I have included quarters for the Engineers and European Subordinates and Clerks. In so doing I am supported by the opinion of Sir Proby Cautley, and it seems to me evident that it is in many respects objectionable to have Engineers and Subordinates engaged in building operations on their own account while employed on Government work. The outlay would of

### SE 7005 VIII.—PLAY OF THE HEAD WORKS.

The principal of these is shown in Plate VIII., and other  
 in Plates VII., IX. and X.; the two latter  
 are on the general  
 of the works. These are on the general  
 of the works, the latter Engineers in their  
 a Dam with a wide  
 and dams and locks  
 of the canal.

The river is about 1,100 feet wide, and of a depth of 7 feet below low water. The bottom is composed of sand and gravel. The river is navigable for small boats. The river is about 1,100 feet wide, and of a depth of 7 feet below low water. The bottom is composed of sand and gravel. The river is navigable for small boats.

SECRET

A page of handwritten musical notation on ten staves. The notation is in a cursive, handwritten style, likely from a 19th-century manuscript. It includes various musical symbols such as notes, rests, and bar lines. The handwriting is somewhat faded and the paper shows signs of age.

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78 Subordinat

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will have to be laid below the level of the dry season stream of the Soane. It will be seen from the sections in Plate IV., that this small elevation of the water will necessitate heavy cutting in the first 7 miles of the Western, and 10 miles of the Eastern Canals. It also gives more unfavourable levels for the passage both of the Tootla and Kao drainage on the west, as will be seen further on. It moreover deprives the canals of the command of ground for irrigation to the extent of about 10 square miles on the west, and perhaps 100 on the east\* side of the river. But on the other hand we have to deal in the Soane with a river of a much greater declivity than those of the Madras works quoted, and having a less ample flood rise, so as rather to aggravate than diminish the violence of its action on the works. Under these circumstances, I have not thought it prudent to rest the whole scheme on the prospect of success in what might be deemed a work of risk—a dam to raise the water surface 12 or 14 feet. But again there is another practical consideration which has weighed with me greatly in coming to this determination. Not only should we be entirely dependent for the success of the whole scheme on the success of the dam at the head of the canals, but we should be unable to obtain a drop of water for irrigation or navigation until this great work had advanced far towards completion. To attempt to construct a high dam would therefore be a source not only of risk, but of delay in giving the districts the benefit of the water, and in obtaining for the capitalist a return for his money. I have therefore rejected the attempt.

Under my proposal of raising the water only 6 feet, all risk of failure in the work itself is avoided, and we shall be able to commence the irrigation not only before the dam is near completion, but before it is even begun.

The method by which this is managed is as follows:—Colonel Baird Smith in his Report on the Madras Works has suggested that it would be an improvement to place the locks a considerable

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\* To raise the canal 10 feet higher would place the Tikaroo branch in its whole length perhaps 2 miles to the south of the position now sketched, and give it the command of the country between the new line and the old one.

distance above the dams, so as to save boats the risk of being carried over in those states of the river when such a thing would be dangerous, if not certain destruction. I have adopted this suggestion, and placed my lock channel head (see Plate VIII.) half a mile above the dam. The lock channel bed on the western side rising by regular gradation at the rate of 0.75 foot per mile will reach the river with a level of only 4 inches above that of the canal bed at its head. But the river surface rising at 3 feet per mile will at the lock channel head be 18 inches higher than at the canal head. At the latter place the dam is calculated to raise the water 6 feet, and the depth of the canal water is  $7\frac{1}{2}$  feet; so that, *without any dam*, there would be  $1\frac{1}{2}$  feet of water on the sill of the canal sluices; and at the lock channel head there will be (18 minus 4 or) 14 inches more. Using the lock channel head as a source of supply, therefore, we shall get nearly 3 feet of water into the western canal without constructing any dam at all. On the eastern side we should not obtain so much, because the bed of the canal is at its head only  $1\frac{1}{2}$  inches below the low water level of the river, and the lock channel is only  $\frac{3}{8}$ ths of a mile above the dam; but even here we should obtain 15 inches on the sill of the Lock Channel Head.

But further it is certain that we shall be able to raise the level of the water some 2 or 3 feet by temporary expedients, without the use of a permanent dam; and I therefore calculate on being able to obtain nearly half the supply of water needed to fill the canals without the construction of the permanent dam. I have consequently not only placed double locks at the heads of the lock channels, but have added a set of additional sluices, so as to make the Lock Channel Heads efficient as heads of supply for the canal while the permanent dam is under construction, and have made the lock channel of the same size as the main canal.

The Lock Channel Head could not be relied upon as the permanent canal head, because we cannot, after the temporary works for raising the water shall have been thrown out of use, depend upon the dry season streams of the river keeping close to the sides so far up the river above the side sluices of the permanent dam.

I have estimated for a temporary dam of piles and clay right *cross* the river, at a cost of Rs. 2,24,469. But it is probable that the whole of the work will not be required. It should be constructed in portions, from year to year, as the necessities of each year's demand for water may dictate.

Mr. Bingham, of Chynepoor, who has had the opportunity for many years of observing the Soane, is confident that the construction of a permanent dam might be avoided altogether, by encouraging the growth of a species of weed which flourishes in patches in the bed of the Soane, and occasionally gives rise to the formation of islands. I do not share in Mr. Bingham's anticipations of success from this plan; but there will be no difficulty in trying the experiment.

The plan of the Western Canal Lock Channel Head will be found in Plate X. It consists of two locks of  $120 \times 16$  feet on the flanks with five intermediate arches containing each four sluices of  $8 \times 3$  feet. A bridge passes over the work at the tail of the locks, and below this is a flooring, first of masonry for 30 feet, and then of dry-stone for 45 feet more, to protect the tail of the works from the effect of the scour. The whole extent of the work is  $255 \times 192$  feet, omitting 100 feet of step revetment on each side of the river bank. The foundations rest on blocks under-sunk 20 feet by a process usual in India, and which will be referred to more fully below.

The cost of the work as estimated will be Rs. 1,33,943.

On the eastern side the plan of the work will be the same, except that there will be only three arches between the locks, and that, as the foundations will rest on rock, no block-sinking or step revetments are necessary. The cost of the work here will be Rs. 60,151.

It will be observed that the floor of the locks has been laid on a level, the upper and lower gates being of the same height, so that boats may be admitted when the river is low as well as when it is in flood. The flooring will have to be laid at a depth of 3 feet below the dry season surface level of the Soane. The method proposed for doing this will be stated below, in describing the proposed permanent dam.

Half of the cost of these works may be considered as due to the construction of double locks for navigation, and the other half to the use of the works as temporary heads for the irrigation supply. The cost of the temporary heads for the canals may therefore be set down as:—

|               |     |     |     |     |              |
|---------------|-----|-----|-----|-----|--------------|
| Temporary Dam | ... | ... | ... | ... | Rs. 2,24,469 |
| Western Head  | ... | ... | ... | ... | " 66,971     |
| Eastern "     | ... | ... | ... | ... | " 30,075     |

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Total Rs. 3,21,515

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which sum (even if all were required) would be amply repaid in bringing the irrigation into operation 3 or 4 years earlier than would be possible if the permanent Dam and Head-works were alone to be relied on. It must be borne in mind that the sum realized by these means will not be merely the small amount of revenue that will be derived from the use of the water in the first three years, but the increase arising from the more advanced stage of progress of the revenue during the whole 10 or 20 years the canals may take to grow to full maturity of operation.

But further, if, as is probable, it be found desirable to attempt at first only a portion of the works, it will be a great advantage to have to charge that portion with these cheap head works only, instead of the costly permanent ones, and to reserve the outlay on the latter till it might be deemed desirable to carry out the entire scheme.

I now proceed to describe the permanent Dam and Head-works, of which the designs will be found in Plates VIII. and IX.; and first the Dam.

The works are, in all essentials, of the same plan as has been successfully carried out by the Madras Engineers on the Godavery and Kistna. They consist of a masonry dam with dry stone apron across the Soane, having side openings, so as to be able to discharge something more than the dry season stream of the river, without interrupting the road-way across the crest of the dam, and to ensure the greatest scour of the subsiding river, and therefore the water of the dry season stream, being at the sides in

convenient positions to feed the canal heads. The Head Regulating Bridges of the canals are placed in close proximity to these side sluices of the Dam. The openings in them chiefly consist of small sluices in solid dam walls, so as to be easily worked under a heavy head of water; but in each head bridge there are two open arches of 18 feet width for the passage of boats, in case of the Lock Channel Head being left dry after the subsidence of the annual floods. These side openings would be permanently closed for the rainy season by massive drop gates, as soon as the river rises sufficiently to make the locks above available.

The sills of the dam sluices are to be 3 feet below the lowest summer level, taken as 347.00 above the zero of the levels—that is, they will be at 344.07.

The crest of the dam will be 6 feet above the lowest summer level—or 353.00. The top of the sluice openings will be 2 feet below this, or 351.00.

Hence there will be a height of 7 feet from the floor to the top of the sluice openings; and a head of 2 feet on the openings by the time the dam is topped by a rise of the water. This head will give a velocity of about 7 feet per second, with the ordinary co-efficient.

I propose to make the width of the sluices 6 feet, and to give 40 on the western, and 24 on the eastern bank, in all 64. These will discharge nearly 20,000 cubic feet per second before the dam is topped. This will save inconvenience from slight rises of the Soane in the dry season, and will afford ample scour to keep the low water channel near the canal heads.

The crest of the Dam being 6 inches above the intended full-supply level of the canals, there will be ample head to produce the necessary velocity in the stream, allowing only the same water-way through the sluices that is given to the canal channels, viz.:—

$$\text{Western } (73 + 11\frac{1}{2}) \times 7\frac{1}{2} = 81\frac{1}{2} \times 7\frac{1}{2}$$

$$\text{Eastern } (52 + 9) \times 6\frac{1}{2} = 61 \times 6\frac{1}{2}$$

Deducting two side openings of 18 feet each for boats, there will remain 48 feet water-way in the western, and 25 in the eastern, to provide for by means of sluices. I propose however to give 28



sluices of 3 feet wide to the former, and 20 for the latter, giving the boat openings as extra. The boat arches will be kept closed in the rains, and it may be convenient, in case of the river being low, to work the canal with the smaller openings only, under a low head.

I have deviated from the Madras model in the block-sinking for the foundations of the masonry. The Madras dams have blocks or wells sunk, sometimes only in a single row, 6 or 7 feet below the dry season stream. I have proposed a double row of blocks sunk 20 feet, the two rows breaking joint. The advantages I expect to gain by this are first, additional security for the work, and secondly, an increase of the supply of water. The first advantage I do not lay much stress on. The Madras works are perhaps sufficiently secure as they are,\* and the peculiarities of the Soane with a dam of only 6 feet high do not imperatively require such additional security. Still it is an advantage.

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\* The following account of an accident to the Godavery works shows that deeper foundations would be advantageous, though doubtless increased breadth of flooring may be relied upon for security in preference to greater depth.

*Extract from Captain Orr's Report, No. 181, dated 19th June 1850.*

Para. 2. I have delayed the transmission of the above Statement for a few days, having to report the partial destruction of the Rallee under sluices, and not being able hitherto, to say how far the damage sustained might extend. The river began to fill on the 9th instant, and has risen steadily till it is now passing 10 inches deep over the highest part of the annicut. While the water was rising to the level of the annicut, the whole river passed through the Dowlaiswaram and Rallee under sluices, which discharged it with intense and increasing velocity. On Monday morning, the 17th, it having been observed that the rough stone apron behind the Rallee under sluices had sunk, the vents were closed, and immediate measures were taken to fill up the hole left behind the rear retaining wall. By 2 P. M., some progress had been made in replacing the stone, and I considered the work safe for the short time required to make up the apron to its full breadth; when suddenly, the pressure was seen to force the sand from beneath the foundation into the hollow behind the rear retaining wall, and instantly a portion of the masonry apron fell in, followed by the subsidence of one of the piers. Pier fell after pier, but the tenacity and massiveness of the masonry was such, that in falling it formed a dam, preventing any great rush of water, and thereby giving time for measures being taken to check the extension of the damage. Up to this time, seven out of the fourteen piers have fallen, leaving the two abutments and seven piers still standing, though two of the latter are much shaken. No change has taken place since last night; and as rough stone is rapidly being thrown in to protect what remains of the sluice, I trust no more of it will be

To the second reason I attach the chief importance. The bed of the Soane, 2 miles wide, and consisting, as I suppose, to a great depth of coarse sand and shingle, is an immense filter. The visible stream of the dry season is only a part of the discharge of the river, and is the part which is most affected by the vicissitudes of dry and wet seasons. It had fallen to 950 cubic feet per second in May 1861. Now if we interpose such an obstacle as a double row of blocks 20 feet deep across this filter, it will, I don't not, force a large increased supply to the surface. The Canal Officers of Upper India are familiar with the fact that even when the Jumna Canals absorb the whole visible stream of that river, the water appears again a few miles down, and 30 miles below the dam is in most places unfordable, although it receives no affluents. Sir P. Cantley calculates the portion of the percolation which thus again rises to the surface as not much less than half the visible discharge of the river. (See his late Report on the Ganges Canal, Vol I, pages 42—5.)

Referring to the estimate at pages lix, lx of the Appendices, it will be seen that the total cost of the Dam is estimated by me at Rs 11,29,269. The foundation blocks contain 1,281,126 cubic feet of masonry. If the two 20 feet lines were exchanged for one of 10 feet, we should save  $\frac{1}{4}$ th of this, which at Rs 15 the 100 feet comes to Rs 1,11,160, half the cost of the curb frames, or lost, and that no breach at the spot will be formed. If successful, as I hope, in preventing the latter, the rebuilding of the sluice will be no difficult matter, and will only affect the completion of the work so far as the loss of the use of the sluice will delay the lowering of the level of the river at the end of the freshet.

3 The cause of this misfortune is clearly the inadequacy of the masonry apron, which instead of being 25 feet, ought to be 20 yards wide at the least, in rear of the vents, and the insufficiency of the rough stone apron, which, though made far stronger than was originally intended, and appearing substantial enough, as far as my judgment and experience could decide, has proved quite unequal to resist the force of the discharge through the sluice, even when the sluiceway is only 10' 10" instead of its ultimate height of 14 feet. The rough apron in rear of the Dowlaowaram under sluice, although exposed to a more severe test has hitherto shown no signs of weakness, which I attribute to its having been severely tried three successive years, and at the end of each greatly strengthened by the addition of more stone, till it has acquired sufficient thickness and stability. The Rallee sluice apron unfortunately has not thus been gradually tested. As a matter of precaution, however, I have partially closed the vents of the Dowlaowaram sluices, and will take the first opportunity to examine and, if necessary, to further strengthen its apron.—  
*From the Madras Engineer Papers, Vol III, page 181*

Rs. 18,475; and, as explained in the note below,\* seven-tenths of the cost of sinking on each block retained, or Rs. 1,25,630 in all, which, with a share of the sum allowed for contingencies, come to Rs. 3,02,678; leaving the cost of the dam reduced to Rs. 8,26,591, exclusive of the cost of plant (Rs. 2,50,000.) Including the plant, the reduction would be from Rs. 13,79,269 to Rs. 10,76,591. This is the largest reduction that could be made on this account in my estimate; but I would recommend that the estimate be allowed to stand in full.

\* The English Engineer will find the process described in papers by Sir P. Cauley in the "Corps Papers" of the Royal Engineers by Vol. I. page 50, and Lieut. (now Lieut. Col.) Yule, in the 1st Volume New Series of the Professional Papers of the Royal Engineers, 1851.

Lieut. Col. A. G. Goodwyn has deduced from his experience on the Ganges Canal works the approximate rule that the cost of sinking may be taken at Rs.  $1\frac{1}{4}$  per 100 cubic feet of the crater that it would be necessary to form to build the block dry in the position in which it is finally intended to stand—that is, the cubic content of the frustrum of a pyramid or cone of which the point is downwards, and the small end equal to the area of the horizontal section of the block, the sides being at the angle of  $45^\circ$  with the horizon. But if the blocks be sunk contiguous to each other, the crater must be taken for the whole set, and each will bear its share of the total. This is because the blocks mutually precipitate each other's descent in such cases. Calculating in this way the sinking of the blocks  $13 \times 7$  in one line across the Soane would cost Rs. 91 each if 20 feet deep, Rs.  $55\frac{1}{2}$  if 15 feet deep, and Rs.  $37\frac{1}{2}$  if 12 feet deep, Rs.  $28\frac{1}{2}$  if 10 feet deep, &c.

The 20 feet blocks in the head works, being uniformly of the full size of  $13 \times 7$  I have taken the cost in sinking Rs. 100 each.

15 feet blocks in the other works, when there is a considerable mixture of smaller sizes, I have taken at Rs. 50 each block all round.

12 feet blocks in like manner, I have taken at Rs. 30 each.

The narrow rectangular block which I have almost uniformly adopted in the designs is one that was strongly recommended to me as much more easily worked than either wells, or blocks with several hollows. The experience of Engineers, however, differs on this point. On the Ganges Canal long narrow blocks were found more difficult to manage than others. On the Railway bridge works at the Soane great advantage was derived from substituting large wells of 18 feet interior diameter for the clusters of small wells which at first were tried. The suitability of the long narrow blocks for the dam across the Soane is obvious. Experiment alone can decide what kind of block will be the best on the whole. But it must not be forgotten that we may be able to dispense with block-sinking altogether, except for the dam and head works; and for these it may be found better to introduce the pneumatic process which has lately been tried with success on the Eastern Bengal Railway works.

The dam, it will be perceived, is to consist of a plain wall of good rubble masonry supported on this double row of blocks which has just been discussed, with a dry stone apron of 135 feet wide all along the down-stream side of the masonry. This dry stone apron in fact is the largest item of expense in the dam. No work of the kind has yet been done in this Presidency; but I find in the Madras works that the rate for such work has been as nearly as possible 10 annas per cubic yard, or in round numbers Rs. 2½ per 100 cubic feet. This rate does not include, as I understand, any portion of the cost of the plant and rolling stock for the railways used to convey the stone from the quarries to the site of the works. This plant (or rather the whole plant, of which this was I believe the greater part) as set down in the last account of the Kistna works (Madras Engineer Papers, Vol. IV., page 70.) is Rs. 1,41,142 on a total outlay of Rs. 7,49,367\* including the Head-

\* I give the table in full, all but the columns referring to the individual month's work, and the annas and pies.

| Description of Work.                               | ESTIMATED.      |                | TOTAL AMOUNT AND<br>VALUE OF WORK PER-<br>FORMED UP TO THE<br>END OF APRIL 1855. |                |
|----------------------------------------------------|-----------------|----------------|----------------------------------------------------------------------------------|----------------|
|                                                    | Cubic<br>yards. | Amount.<br>Rs. | Cubic<br>yards.                                                                  | Amount.<br>Rs. |
| Rough stone ... ..                                 | 2,28,602        | 1,57,161       | 3,72,744                                                                         | 2,56,262       |
| Rubble ... ..                                      | 53,916          | 1,28,050       | 51,663                                                                           | 1,22,711       |
| Cut-stone ... ..                                   | 16,223          | 82,225         | 5,199                                                                            | 27,195         |
| Partially dressed stone ... ..                     | 1,002           | 3,276          | 2,179                                                                            | 10,139         |
| Brick in chunam ... ..                             | 2,001           | 5,129          | 1,593                                                                            | 4,777          |
| Earth-work, excavating foundations,<br>&c. ... ..  | 7,75,000        | 48,137         | 9,18,611                                                                         | 63,072         |
| Wells ... .. No.                                   | 2,299           | 16,157         | 1,784                                                                            | 12,158         |
| Contingencies, sundries, plastering,<br>&c. ... .. | ...             | 1,03,800       | ...                                                                              | ...            |
| Plant ... ..                                       | ...             | 1,11,107       | ...                                                                              | 1,41,142       |
| Pay of Officers, superintendence, &c. ... ..       | ...             | 85,936         | ...                                                                              | 68,773         |
| Grouting ... ..                                    | ...             | 5,000          | ...                                                                              | ...            |
| Opening quarry ... ..                              | ...             | 7,000          | ...                                                                              | 7,303          |
| Sluice shutters ... .. No.                         | 62              | 1,860          | ...                                                                              | 2,910          |
| Lock gates, ... .. pairs                           | 6               | 9,500          | ...                                                                              | 10,217         |
| Embanking river ... ..                             | ...             | 1,000          | ...                                                                              | 80             |
| Total ... ..                                       | ...             | 7,66,511       | ...                                                                              | 7,27,730       |

works as well as dam, the latter being, as before stated, 1,100 yards long. Having no experience as to the cost of work of this kind on a large scale in this Presidency, I have not thought it safe to estimate so low as the rate which was obtained for the Madras works, although there is no material difference in the price of labour, as far as I can ascertain, and though the carriage will be for a less distance than in the case of the Godavery works, but greater than in the case of the Kistna. I have taken the rate at Rs. 4 per 100 cubic feet and have allowed besides Rs. 2,50,000 for plant, as a separate charge. The dry stone-work done on the Ganges and Baree Doab Canals is generally rated at Rs. 6 to  $6\frac{1}{2}$  the 100 cubic feet, but this is without the assistance of carriage by rail. The rate I have assumed, if the plant be included in the cost, will amount to about Rs. 6, so that I feel confident that the rate is a safe one, and hope that some saving will be effected in the execution of the work. The plant will chiefly consist of rails and wag-gons. The experience gained on the Ganges Canal works points out that all the iron-work should be obtained direct from England, and that the wag-gons should tilt to the side and not in front.

The stone will be obtained from the river bank or any part of the low range of hills shown in Plate VII. on the right or east bank of the river, and from the foot of the Kymore range, 2 miles distant from the river bank, on the left or west side. Considering the width of the river, the average distance of carriage will probably amount to three times the distance in the case of the Kistna works where the stone quarries were close to the works; and the distance of the proposed site of the Soane Canal works from the sea will enhance the cost of the carriage of the iron-work to the site. I think therefore the cost of the plant cannot safely be estimated at less than  $2\frac{1}{2}$  lakhs of Rupees, being an increase of 66 per cent. on that for the Kistna works. In this I include the cost of laying down the rails with all the works necessary to that end. I have not thought it necessary in the present stage of the project to go into further detail as to the Railways and other plant.

I have already stated that the flooring of the side sluices of the Dam will have to be laid 3 feet below the ordinary surface level of the dry season stream of the Soane. I now describe the method proposed for doing this.

The stream must first, if necessary, be turned, and the channel filled up with sand to the water level. The masonry blocks will then be sunk all round the space on which the floor is to be laid, the last 5 feet of the block being built upon a thin wooden frame, so as to admit of being broken up afterwards without disturbing the masonry below. Then the sand is to be excavated as far as possible from the outer side of the blocks for 15 or 20 feet, and clay rammed down to the depth of at least 6 or 8 feet. The blocks will also be filled in with clay to within 5 feet of the top. The sand will then be excavated from the whole interior space to a depth of 8 feet below the water. This may be facilitated by raking it together by means of large hoes drawn by ropes. Having excavated the sand, concrete will be thrown in (using boats) unslaked, either in thin bags or loose, and will then be well rammed, so as to secure a 3 feet layer all over the area to be floored. As soon as the concrete has set, the water will be pumped out, the upper 5 feet of the blocks will be removed, and the flooring (2 feet thick) laid dry in a water tight (or nearly water tight) cistern 5 feet deep, of which the clay will form the sides and the concrete the bottom. I have allowed Rs 50,000 in the estimate, in addition to the cost of the blocks and concrete (charged at the same rate as masonry), to cover the cost of this work, and such other diversions of the stream and removals of sand as may be necessary during the progress of the works.

In the Madras dams the flooring of the side sluices, owing to the great degree in which the level of the water was raised, was not below the level of the summer stream. The following extract from Captain Orr's Report\* of 30th July 1852, shows the method used by him to fill up, and carry the dam across, the channel of the dry season stream, which in the Kistna was much deeper than anything we have to deal with on the Soane —

"3 — The foundations of the under sluices, at each end of the annulet, will be laid as soon as the river shall have fallen sufficiently, and their construction will be pushed on as rapidly as practicable, in order that, if possible, the floors may be laid during the season, so as to allow the vents to be made use of the following year as outlets for the river, while the body of the dam is in progress."

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\* Madras Engineering Papers Volume IV., page 38.

"4.—It has been found at the Godavery, that, when the body of the annicut rested on a mass of loose stone thrown in to fill up hollows in the river bed, as at the sites of the various breaches that occurred during the progress of the work, it was not only difficult, but almost impossible, to render the dam water-tight; the leakage at those places being not mere percolation, as along the rest of the work which was supported on wells sunk in the sand, but strong continuous streams, flowing at a great depth through the large open interstices of the rough stones, as through inverted syphons. As there can be no doubt that the same thing would occur here, wherever the annicut should rest upon rough stone thrown in to fill up the hollows in the bed of this river, it is my intention not to fill in these hollows on the line of the body of the work, but on that of the apron, and then to fill up in front to the proper level with sand, on which wells will be sunk and thereon the annicut be built."

In the plan of the side sluices of the dam I have deviated from the Madras model in keeping the road-way over those openings on the same level as the rest of the dam, instead of raising it by a gradual slope to the level of the top of the river bank. In the Madras plan the road-way over these side sluices forms the ramp by which to ascend from the level of the dam top to the embankment at the river side. In my plan the ramp has to be formed as a separate work by excavation within the embankment. My object in this change was simply to avoid the additional obstruction to the stream which the raised mass of masonry at the flanks causes. I do not think that there is any objection to this change on the score of courting too much action on the side of the river near the works, considering the ample protection given to the bank.

Nor do I think there will be any difficulty in working the simple apparatus of vertical stop boards to the openings in the side bridges. They may be secured by ropes to the shore, and so removed without difficulty in case of any very sudden rise of the river. It is however very unlikely that any such rise would take place as to render it difficult to remove the stop boards by degrees by hand.

The cost of the Head Regulating bridges, as will be seen in Estimate No 3 in the Appendix, is for the

|               |             |
|---------------|-------------|
| Western Canal | Rs 1,46,316 |
| Eastern Canal | “ 33,712    |

The great difference arises, first from the larger size of the Western Canal, second from the Eastern Canal Head bridge being founded on rock, and third from the cost of protective works along one mile of the river bank being included in the Estimate for the Western Canal Head-bridge, to the amount of Rs 40,052.

## SECTION IX.—ALIGNMENT OF THE CANALS

### *A—Western Canal, Main Line*

Passing from the head works the canal will soon come to the deep cutting west and north of the village of Tooma or Toomba. This deep cutting is, as has already been mentioned, occasioned by the small degree in which I have thought it proper to raise the river water by the Dam. The most suitable line for the canal to take, as regards level, would be through the village of Tooma, west of it deep cutting is necessary, and east of it there is only low land liable to flood. A similar case will be noticed on the right bank of the Soane, where there is low *khadir* land, and where, as here, the villages are placed on the very lowest safe portion of the high bank above it, so as to be as near as possible to their cultivation, and yet out of the reach of the floods. I have not thought it worth while to disturb the village, though doubtless the cost of constructing a new one and taking the canal through the land now occupied by the village would be cheaper than the present heavy cutting.

After passing Tooma the canal line is kept as low as possible (see Section I, Plate IV), but still in heavy cutting, to nearly the end of the 7th mile, where it comes upon the Tooth drainage, which is sketched in some detail on Plate IV. Three 10 feet inlets\* are required at the sites shown in Plate VIII, and two others for small water-courses at the end of the 2nd and in the 5th mile. Two larger nalas at the end of the 3rd, and in the 6th mile are

\* Plate VIII contains the designs for inlets and escapes. They are on the ordinary plans, and do not require any special remarks.



provided for by 20 feet inlets; but, if possible, they should be passed over the canal by bridges which will not the less answer for ordinary village communication, so that the arrangement will tend at once to efficiency and economy.

The small River Tootla drains about six square miles of country on the table-land of the Kymore range, from which it descends by a fine water-fall (in the rains) and runs for about three miles in the plains till it comes to a flat tract, in which it is lost. The channel when it emerges from the recess in which is the water-fall, is above 100 feet wide, with a boulder bottom. Where the canal line of 1857 crosses it (Plate IV.), it has a bold well defined channel, of the Section shown in Plate IV. But after that it begins to diminish in width and depth till it becomes a ditch 2 feet wide, and then finally disappears in the flat tract marked on the map, which becomes a swamp or *jheel* in the rains. Into this also run, and in like manner are lost, the other water-courses from the hill side further north. (All these channels are dry, except during the rainy season.)

A reference to Sections G and H will show the cause of this phenomenon—it is simply that there is no fall of the ground towards the Soane, and only a very slight fall to the north. When the floods are severe they chiefly find vent by the channels which again issue from the *jheel* towards Tilothoo. But in ordinary cases most of the water in this natural reservoir is used for the rice crops, and issues finally by the passages south of Maharajgunj, south of Putlooka, and west of Hoorka. Near Maharajgunj there is a dam to turn the waters north-east.

The whole of the drainage collected in this bason is that of about 6 square miles in the hills and 16 in the plains, or 22 square miles in all. Sir P. Cautley estimates the maximum flood discharge in such cases at half an inch per hour from the whole area, which gives 323 cubic feet per second from each square mile. The whole discharge in this case may therefore be reckoned at full flood as equal to 7,106 cubic feet per second. But again we have the level of the bed of the Tootla where it issues upon the plains 379.17 feet above datum, and where it is crossed by Section G. in Plate IV. it is 359.49. The difference is 19.68 feet in about two miles.

The area of the section at the point where the canal line of 1857 crosses is 322 square feet, and the flood height here is well known, being close to the Indigo Factory bridge. The ordinary rules give a velocity here of 9.22 feet per second, and hence we have a flood discharge of 2,968 cubic feet per second for the Tootla alone, which carries rather less than half the whole drainage. Hence the estimate of 7,106 feet per second for the whole drainage, as calculated in Sir P. Cautley's method, is confirmed by this independent determination.

It will be seen that the canal line enters the jheel at the end of the 7th mile, and from this to the end of the 8th the levels are awkward, the canal being in 12 feet cutting, and having its surface therefore  $4\frac{1}{2}$  feet below the soil above which is the jheel water. The drainage water might be carried over the canal with ease, but for the necessity of preserving a good head-way for navigation. To carry it through the canal at such levels would be very awkward, and the only alternative of passing it under the canal requires deep and costly syphon drains\*. I have designed five of these, with 10 openings of  $6 \times 5$  feet in each. Each drain of 10 openings, under a head of 1 foot of water on the up stream side, will pass 1,500 cubic feet a second, and will cost Rs 57,313 if under-sunk foundations are necessary, or Rs 12,638 with ordinary foundations. For five drains the cost would be Rs 2,86,565 or 2,11,190, according to the nature of the foundations. I propose to place them as nearly as possible where the drainage now crosses the country—three in the 8th mile, one near the end of the 9th, and the fifth near the end of the 10th mile of the canal line.

By cutting channels for the drainage, however, from the canal line towards the Soane, we shall be able to reduce the level of the drainage water, and so pass it by dam, or by less costly syphons. I have preferred the latter expedient at a cost of Rs 3,10,950, to the former at a cost of Rs 2,30,290. The advantage of keeping the drainage water out of the canal more than makes up for the difference of cost. The Estimates in both cases include the cost of under-sunk foundations, and if we are able to dispense with these,

the amounts will be reduced to Rs. 2,31,695 and Rs. 1,56,785 respectively. The details of the works will be found in Plate XI., and in the Estimate No. 5, Appendix, pages lxxvi. to lxxx.

The necessity for such expensive works for crossing this comparatively small drainage, suggests the possible advantage of adopting some other line where less costly works will answer. I do not think, however, that any better line can be had. To go further towards the hills would certainly enable us to cross the drainage at a better level, but it would necessitate heavier cutting or very great and undesirable winding of the channel. The only line further east that is at all likely to succeed better is one carried nearly along the line of the road parallel and near to the Soane bank, which I first proposed for the Western Soane Canal. On this the Tootla and Bustipoor nala would be crossed near the Soane, where they are well developed and have large defined channels. To reap the whole advantage of this line in crossing the drainage where fully developed, it would be necessary to carry the main line to Bustipoor near Dehree, which would make the detour for the Sasseram Branch very great. On the whole, I do not anticipate any advantage, but it would be satisfactory to have this alternative line fully investigated before the line I have proposed is finally adopted.

The main line terminates after  $10\frac{1}{2}$  miles, and divides, at the end of the Tootla drainage valley, into the Arrah and Sasseram Branches.

*B.—Arrah Branch with its subordinate lines.*

The Arrah Branch is to carry 877 cubic feet per second, with a width at bottom of  $42\frac{1}{2}$  feet,  $5\frac{1}{2}$  feet depth of water, and 1.04 feet of fall per mile. It divides into branches as follows:—At 32 miles from the main canal head it gives off the Ranipoor Branch, at  $40\frac{1}{2}$  miles the Peeroo Branch, and at the 56th mile the Nansaugor Branch. The Peeroo Branch also gives off the Jugdispoor Branch. The dimensions of all these will be found given in the Table in Section 5.

At the 13th mile from the Head of the Main Canal, the Arrah Branch crosses a small ill defined nala near Nowadeeh.

This nala drains an area of 4 square miles, and its greatest discharge may be reckoned at 1,300 cubic feet per second. It might therefore well be passed under the canal in the same way as the Tootla drainage, but at less cost, the levels being more favourable. I have however laid out the Section to cross it on a level by inlet and dam. This I think should be altered in executing the work, and I have provided in the estimate Rs. 50,000 for the passage of this drainage by syphon or aqueduct, the fall being removed from the 13th mile to the 14th, that is, below the passage of the nala.

This is I believe the last drainage that will have to be passed across the canal on this line. For the rest of its course it should keep on the water-shed of the country. It is evident that an error has been made in laying out the latter part of the Arrah Branch, which should proceed from the 51th mile west of Buroonan on Section S, to near Shapoor on Section T and to near Kusap on Section V, falling into the Bunas near Usnee. The detailed examination of the country does not however extend beyond the Grand Trunk Road,\* and I can only say with Sir P. Cautley:—

“The want of detailed surveys of the superficial lines of drainage and hollows which intersect the surface of the country over which the line of canal runs will prevent my entering into a description of the subordinate cuts which will be required for relieving the canal and the country from intercepted drainage. The rule, however, which I have before adverted to, as that which have been our guide in the main canal works, is, I believe, to be recommended, viz., to draw away from the canal alignment all intercepted water, and to carry it by artificial cuts into the natural lines of drainage lying on the right and left.”—Volume I., page 395, Sir P. Cautley's Report.

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\* The best method of completing the detailed survey of the country will be this.—First to obtain from the Surveyor General's Office tracings of the Village Maps of the Revenue Survey, which may be carefully combined so as to produce sufficiently accurate maps of large tracts of the country on a scale of 4 inches to the mile. The topographical details of these will be found very imperfect, as the Revenue Survey, at the time Shahabad and Behar were surveyed, undertook no details that were not required for Revenue purposes; but these maps will give a good base on which to work. The plots of the levels, and detailed compass surveys of parts of the country requiring close attention should be inserted in these maps, and the topographical details otherwise improved.

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This is I believe the last drainage that will have to be passed across the canal on this line. For the rest of its course it should keep on the water shed of the country. It is evident that an error has been made in laying out the latter part of the Arrah Branch, which should proceed from the 54th mile west of Buroonan on Section S, to near Shapoor on Section T and to near Kusap on Section V, falling into the Bunas near Usnee. The detailed examination of the country does not however extend beyond the Grand Trunk Road,\* and I can only say with Sir P. Cautley —

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But though there should be no direct drainage to pass across the lower parts of the Arrah Branch, there are flood waters from the Soane to be dealt with as follows:—

The Soane floods first appear on the west bank at Umeāwur south of Nasreegunj (Plate V.,) in the 31st mile of the canal line, but they do not cross the country, and may easily be embanked off or avoided by a slight change of line, so I understand from Captain Farrington's note on the subject.

The next point where the floods are met with is just above Nonore, where they cross both the Arrah and Nansaugor branches but in very slight volume. An inlet of 100, and escape of 150 feet will be provided in the estimate on the Arrah Branch, but it will possibly not be required in actual construction.

Below Turkoul the Soane floods pass nearly due north to the angle of the Nugree in considerable volume, passing the Nansaugor branch in the 13th and 14th miles. Again from about Bishoonpoor to Furhungpoor there are, here and there, heavily flooded tracts, passing the branch from the 16th to the 21st mile. The depth of flood does not appear any where to exceed 3 feet in ordinary cases. As the Nansaugor branch is little more than a ditch, I do not propose to make any provision for the passage of these floods beyond leaving ample openings in the spoil banks and supplying regulating planks to one or two bridges to prevent the floods passing down the line. In ordinary cases they will probably do very little injury, and whatever damage they do may be repaired annually at no great cost.

In connexion with this subject it may be noticed here that there are a few native irrigation channels from the Soane on this bank, which are used only for conducting its flood waters in the rains. They are what in the Punjab would be called small Inundation Canals. In Behar they are called *Pyens*. One passes the Arrah branch at the end of the 42nd mile into the *jheel* at Dunwar. Another flows into the country a short distance above Behta (at the 43½ mile); it probably joins the head of the Banas to the Soane; and a third extends from Undharee to Junpooreea, crossing the canal at the 49th mile. Inlets and escapes are provided for all these, but they will perhaps not be required, as the canal irrigation will supersede the use of these *Pyens*.

The termini of the Arrah and Nansaugor Branches have been carried in the lines of levels by Captain Farrington beyond the Railway. This was not intended by me, and should be altered when the lines are finally laid out.

*C —Sasseram Branch and its subordinate lines*

The Sasseram Branch where it leaves the main canal is to have a discharge of 1,091 cubic feet per second, a width at bottom of 49 feet, depth of water 6 feet, and fall per mile 1 foot. From the bifurcation of the main canal the line only runs 7 miles to Kuroundea, where it divides into three branches for irrigation, and one for navigation.

These are the following —

Sasseram Branch (lower part),  
Jugceewun Branch,  
Buxar Branch,  
and Sasseram Navigable line

From these again are given off the—

Chowra Branch,  
Buradhee Branch,  
Doomraon Branch,  
Kochus Branch,  
the Navigable line to the Kurrumnassa,  
and the Main Navigable line to Benares

The discharge and dimensions proposed for all these will be found detailed in the Table, Section V, and their directions are sketched in Plate III, except the Kurrumnassa Navigable line, which, however, is parallel to the last portion of the Chowra Branch.

No part of the lines for these branches has been examined in detail, except that of the upper 7 miles of the Sasseram Branch, where it is intended to retain the full discharge of 1,091 cubic feet per second, and of this the line can hardly be considered as settled.

It will be observed that the line adopted is nearly straight from the bifurcation of the main canal to the Kuroundea trifurcation. (See Plates IV and V.) The line passes inside the Gonsa Hill, and will be in rather deep cutting for the whole distance.



to the point where it crosses the Kao. There are four small drainage channels crossed, two near the end of the 12th, and two near the end of the 13th miles. These four do not drain in the aggregate much more than one square mile, and may be admitted into the canal by inlets with drops. Two 10 feet inlets may with a little cutting be made to answer. The cost may be set down at Rs. 9,000. The next drainage crossed is the Dhodand Nala, which intersects the line near the end of the 14th mile and carries a drainage of under 3 square miles. This will, I think, be best disposed of by a cut of  $1\frac{1}{2}$  miles to carry it, together with the next nala crossing the line at the 15th mile, into the Kao. The cutting required will be on the average about 8 feet by 30, or for the mile and a half say 2 millions of cubic feet, at Rs. 2 per 1,000 = Rs. 4,000. But I suppose it will be necessary to give two bridges, each of one arch of 28 feet, which will cost Rs. 14,000 more, making Rs. 18,000 in all. The drainage will be cheaply disposed of at this sum. Adding the Rs. 9,000 above mentioned for inlets, the total charge for minor drainage works on the line will be Rs. 27,000.

The River Kao has been described in para. 32 of the Report of 1855. The branch which forms the Kao may be reckoned to have in all a drainage area of 25 square miles, and an extreme flood discharge of 8,100 cubic feet per second.

The Kao is crossed near the end of the 16th mile, where it has a width of 58 feet and a depth in flood of 14 feet, between hard well defined banks. The site would be an excellent one for an aqueduct, but the levels unfortunately forbid this. The bed of the river is  $5\frac{1}{4}$  feet below the bed of the canal at the crossing, and the flood level  $1\frac{1}{2}$  feet above the surface level of the canal at full supply. By altering the position of the fall and locks so as to place them above the crossing, the levels might be so altered as to bring the bed of the canal 3 feet below that of the Kao, and the surface level of the canal 9 feet below that of the river. In this position the river might with no great difficulty be forced over the canal, were it not for the necessity for providing head-way for navigation. I have therefore of necessity designed a dam for this crossing. It consists of six openings of 10 feet each, giving 840 square feet of water-way; an upper bridge is added on the line of

the western bank of the canal (the dam bridge being on the east), and curtain walls across the canal bed, and the space between them and the bridge is floored over. The estimated cost is Rs 50,321.

But the water-way of 840 square feet, though more than the natural channel of the river possesses, is little enough to pass a flood of 8,000 cubic feet per second. I have therefore proposed further to place an inlet of 50 feet water way upon the nala which issues from the Kao above, and rejoins it with some additional drainage below the canal crossing, and to give an escape on this nala of nine openings of 10 feet each, being 720 more square feet of water way. This escape will also serve for the regulation of the canal waters above the trifurcation.

The cost of these works would be—

|        | Rs     |
|--------|--------|
| Inlet  | 5,000  |
| Escape | 15,500 |
|        | <hr/>  |
| Total  | 20,500 |
|        | <hr/>  |

A Fall and Locks for an 8 feet descent are required immediately after the passage of the Kao, and are sketched in on Plate XIX.

The Barrier Bridge and Lock Channel Heads above the fall may serve as regulators to stop the flow of the flood waters down the canal. Three more inlets of 10 feet opening each will be necessary before we come to the trifurcation, one of which will be taken in at the lock head in lieu of a Distributary issuing there, as the levels will not admit of irrigation on the west side. It will also be necessary to take the drainage into the Sasseram Branch below the trifurcation by 10 feet inlets in two cases, but after passing Adamppoor (Plate XIX) it will appear from the Section to Plate III that the drainage may be carried by cuts into the Koodra, and from this point the canal lines dependent on the Sasseram Branch should be free from all entrance of drainage water.

In consequence of the escape being placed upon the Kao above the Grand Trunk Road crossing, it will be necessary to cons-

is about Rs. 80,000 each. We have then a very rough extreme estimate thus:—

|                                                          | Rs.             |
|----------------------------------------------------------|-----------------|
| 10 Bridges as per Design No. II., at Rs. 16,000 each ... | 1,60,000        |
| 2 Falls as on Ganges Canal ... ..                        | 1,60,000        |
| Total ...                                                | <u>3,20,000</u> |

This, though a large sum, does not much exceed that estimated for the Tootla drainage, and I have included it in the general estimate. If on a detailed examination the work should be deemed unadvisable, we can fall back upon the cheaper design for a dam.

Of the remaining flowing canal lines depending on the Sasseram Branch, I have no more to say beyond what will be stated in the estimate.

It will be best to take the navigable line from Sasseram, close past the town and west of the Koodra, if it can be done without undue expense. It will then join the Main Navigation Canal to Benares after the latter has crossed the Koodra. This main line will also have to cross the Doorgowtee, Koora, Soora, and Kurumnassa. In the absence of all details I have taken the cost of the passage of these rivers at Rs. 800 per running foot of water-way, which I believe will be found a sufficient estimate, including the cost of embanked approaches.

*D.—Eastern Soane Canal, Main Line.*

In the first 3 miles of this line the route of 1857 corresponds very closely with that finally chosen in 1861. From the end of the 3rd mile Lieut. Whish struck into the high ground, and avoiding all drainage, carried his line through rather deep cutting for 6 miles, when it issued on the level of the plains. This course was undoubtedly judicious under the more favourable levels obtained by the canal head being at Khabra. But having now determined to place the canal head at Jhikutteea, I thought it proper to endeavour to avoid the very deep cutting which this early entry upon the high ground with the new level of head water would entail; and I therefore took the line of 1861 nearer the river, passing a great deal of small drainage and rugged country till I attained moderate cutting on the level plains at the end of the 10th mile from the head. The

cutting from 3 to  $9\frac{1}{2}$  miles from the head would, were Laent Whish's line adopted with the new head, have averaged 30 feet deep, and would have amounted for that  $6\frac{1}{2}$  miles to 93,000,000 cubic feet. The quantity of excavation on the line of 1861 is about 51,000,000. There is therefore a saving of 39 millions of cubic feet of excavation, which at the rate of Rs 4 per 1,000, assumed in the estimate, comes to Rs 1,56,000. But against this we have to put the cost of passing the drainage of a strip of country about  $\frac{3}{4}$ th of a mile wide, from the 4th to the 9th mile, from which the maximum discharge of water (if we take it at 4 square miles) will be about 1,300 cubic feet per second. To pass this in the most expensive way, namely, by syphons, as in the case of the Tootla floods, will come to less than Rs 60,000, so that the change of line gives a saving of nearly a lakh of rupees.

To return now to the details of the course of the canal. I have already mentioned that the first 4,000 feet of the main line may possibly be in rock cutting, some portion of it certainly will be so. The same is the case with lock channel, with exception of the first 300 feet, which is in an alluvial deposit, with rock probably not higher than 3 or 4 feet below the level of the Soane low water. In this rocky piece of country there will be two inlets for nalis, as shown in Plate VII. These will descend into the canal with a drop of several feet, but their beds being of rock it will be unnecessary to provide any masonry except the bridges to carry the canal bank road. For these the cost entered in the general estimate is that for 10 feet inlets on a level (Estimate No 9 of Appendix), Rs 2,000 each.

The first drainage we come to after these is the Dhoondhooa Nali, which carries the drainage of the greater part of the northern face of the Putthurghatta Hill, or of about 3 square miles at the most. The discharge on the ordinary calculation would therefore be about 1,000 cubic feet per second at the heaviest.

About the middle of the 2nd and about the middle of the 3rd mile are two nalis which may drain as much as a square mile each, which the canal passes in low patches of rice fields. These cannot be turned by cuts without heavy excavation, and will therefore have to be passed across the canal. A small nali, a little

|                                                |      |     |     |            |
|------------------------------------------------|------|-----|-----|------------|
| At Rs. 3 per 1,000                             | ...  | ... | ... | Rs. 24,566 |
| 5 per cent. contingencies                      | .... | ... | ... | " 1,229    |
| Total Earth-work                               |      |     |     | Rs. 25,795 |
| One bridge of 28 feet span over the cutting in |      |     |     |            |
| the 5th and 6th miles                          | ...  | ... | ... | " 7,000    |
| Total for Drainage Cuts                        |      |     |     | Rs. 32,795 |

For the whole drainage then the cost will be as follows:—

|                        |     |     |     |              |
|------------------------|-----|-----|-----|--------------|
|                        |     |     |     | Rs.          |
| Two inlets in 1st mile | ... | ... | ... | 4,000        |
| Syphon drains          | ... | ... | ... | 1,19,000     |
| Drainage Cuts          | ... | ... | ... | 32,795       |
| Grand Total            |     |     |     | Rs. 1,55,795 |

The main canal ends at  $11\frac{1}{2}$  miles from the head, in 11 feet cutting.

*E.—Patna Branch and its subordinate lines.*

After quitting the main canal the Patna Branch will begin to give out water for irrigation on the surface of the country at  $12\frac{1}{2}$  miles from the main canal head. It continues on the water-shed between the Burwai Nala and the Soane, and beyond the Burwai, still at very satisfactory levels as far as the 29th mile and over a country apparently of good stiff soil. From the 29th to the 49th mile of its course the country is uneven and the soil more sandy. The local drainage appears to be complicated by depressions arising apparently from old beds of the Soane, and it will require a detailed survey to settle precisely the proper line to take for the canal, and the drainage cuts that will be wanted. No difficulty is however to be apprehended, and the expense in drainage cuts will probably be more than covered by the 5 per cent. allowed for contingencies in the estimate of excavation.

The Soane appears at one time to have passed inside the Towns of Daoodnugger and Ahmedgunj, or between them, or rather between their sites; for the towns were not at that time in existence.

On the east bank our examination of the Soane floods had not extended below Sydabad, when the mutiny of 1857 stopped proceedings. At Sydabad there is an old channel of the Soane by which it is said the river formerly entered the Ganges near Patna. Soane flood water crosses the country by this, but the extent and course of the flood was not ascertained.

Above Sydabad the only points where the floods pass are near Ibrahimpoor Sakree, and Ehyapoor, and again at Mohābālipoor (on the 59th and 63rd miles of the canal), where a small spill over the bank takes place and the water flows to the Poonpoon. The spill appears to be so slight that it may be safely embanked off. The canal should be carried on the water shed within half a mile of the Soane bank, and the spoil bank all thrown on the Soane side. But if the floods below Sydabad prove very formidable, it will be better to make the Paleegunj Branch the main line, and carry the navigation down the Poonpoon to the Ganges, leaving the irrigation of the tract from Mohābālipoor to Sydabad, and beyond, to be provided for by small channels which the floods may be allowed to pass over without doing serious damage.

*F—Tikaree Branch, with its subordinate branches*

This canal is to carry 400 cubic feet per second with a width on floor of 26 feet, and depth of water 4 feet, and divides into numerous branches to irrigate the country in the angle between the Poonpoon and Grand Trunk Road as far as Tikaree. This part of the project has been less investigated than any of the others.

The country here is perhaps more in need of irrigation than that to be watered by the other branches, but the water has to be carried across so much formidable drainage that it will hardly be a paying line. Still I think it ought not to be omitted as an essential part of a scheme of which the object is to utilize as far as possible the waters of the Soane.

I have only information enough to enable me to lay down the principles on which I propose to lay out the works. The exact line to be followed will possibly vary greatly from what has been sketched in Plate III.

With the Main Tikaree Branch the object is to carry the water as far as possible to the westward, avoiding as much as we can loss of level, so that we may extend the benefits of the irrigation to the greatest possible portions of the tract between the rivers which fall into the Poonpoo and Morhur. To carry out this object it will be necessary to carry the main line without a fall, or as nearly as possible without a fall, from its head to the country due south of Tikaree, keeping as far as possible to the south without getting into deep cutting. The deep cutting in the centre of the *Doabs*\* crossed should be avoided by curving the canal to the north in passing the high ground, and again recurving to the south for the passage of the rivers. It may be necessary to give a less declivity to the Main Tikaree Branch than has been allowed in the Table; in order to bring a sufficiently large area under its command for irrigation, I should not hesitate to reduce it to 1 foot in the mile, which indeed the Sketch in Plate III. assumes to have been done.

The drainage to be crossed will consist of :—

|                    |     |     |     |            |
|--------------------|-----|-----|-----|------------|
| The Poonpoo, about | ... | ... | 200 | feet wide. |
| Bootana            | ... | ... | 600 | "          |
| Uddree             | ... | ... | 150 | "          |
| Tikaree            | ... | ... | 60  | "          |
| Madar              | ... | ... | 150 | "          |
| Dhawa              | ... | ... | 60  | "          |
| Neera              | ... | ... | 20  | "          |

For the aqueducts for the Poonpoo and Bootana Rs. 1,000 per foot forward† of water-way, approaches and all works included, will probably be an outside estimate; for the other rivers Rs. 600 per foot forward will suffice. But of these latter rivers I have only single and rough Sections, so that the whole estimate will be subject

---

\* *Doab*, literally *two waters*, a convenient word, of Persian origin, for the tract of country between two rivers.

† The cost of the great Solani Aqueduct on the Ganges Canal comes to about Rs. 3,600 per foot forward, about half being for the embankment across the valley. The width of masonry over all was 180 feet. For the Tikaree Branch 60 feet will be the outside width, with a liberal allowance for road-ways on both sides, and there is no valley to cross at the Bootana.

to much modification. I shall set down the cost of the drainage works thus :—

|                        |     |     |          | Rs. |
|------------------------|-----|-----|----------|-----|
| Passage of the Poonpoo | ... | ... | 2,00,000 |     |
| Ditto Bootana          | ... | ... | 6,00,000 |     |
| Ditto Uddree           | ... | ... | 90,000   |     |
| Ditto Tikaree          | ... | ... | 36,000   |     |
| Ditto Madar            | ... | ... | 90,000   |     |
| Ditto Dhawa            | ... | ..  | 36,000   |     |
| Ditto Neera            | ... | ..  | 15,000   |     |

There will be nothing peculiar in the laying out of the minor channels except that the country has a rapid fall, which will require numerous Falls or Locks. But this expense may possibly be avoided to some extent by giving the canals a serpentine course.

#### SECTION X.—FALLS, LOCKS, AND BARRIER BRIDGES.

The question as to which is the best form of Fall for irrigating canals has for some years occupied the attention of Canal Engineers in Northern India. The object of these works is to get rid of a greater declivity of bed than it is expedient to allow in mere earthen channels, and it is sought to be attained by giving at intervals sudden falls protected by masonry, between which the simple earthen bed may preserve its proper slope. Three forms have been used in Northern India (and I believe also in Italy); first, the Ogee Fall, which is in use on the Jumna and Ganges Canals, and in a few cases on the Baree Doab Canal; second, the Drop Fall with or without a grating, and third, the Rapid, both of which are in use on the Baree Doab Canal. Sections of these three forms are given in Plate XIV.

In choosing the Ogee Fall for the Ganges Canal in preference to the Drop, Sir Proby Cantley observes :—

"I have from the first considered this question of perpendicular fall, under every imaginable point of view that offered itself, and I am fully impressed with the conviction, that in dealing with large masses of water, as we are proposing to do in the Ganges Canal works, under the circumstances of the soil and slope of the



bed; under the nature of the material with which we are forced to construct our buildings; and under a continuous flow of water equal to that which I have noted above, the perpendicular fall would be inapplicable; it would, in my opinion, be expensive and dangerous; and further than this, I cannot imagine that floorings made of brick would for any length of time be able to withstand the concussion, and the violent action of the water in the reservoir.

“Although discussing a principle, I have used the expression expense in the foregoing paragraph. This item would in many of our falls have been one attendant, in an exorbitant degree, on the adoption of the perpendicular and reservoir plan. The reservoir, to be efficient, must have been equal in depth to the height of the fall, or at least equal to one-half of it; its sides and floorings must have been built of the most massive proportions, and the work, supposing that brick is used, must have been most carefully executed. In cases such as the Puttri Falls, where the foundations were actually laid  $21\frac{1}{2}$  feet below the surface of springs, and where I was obliged to sacrifice the reservoir at the foot of the drop in the lock chamber, in consequence of the extreme difficulties that we had to contend against, the cost of perpendicular falls, with their necessarily attendant reservoirs, would have been enormous.”

The Ogee Falls have not, however, completely answered Sir Proby's expectations. It would seem in fact that the action of the short Ogee in the case of such a body of water (6,750 cubic feet per second) was much the same as that of a perpendicular drop; at least the wear and tear in the case of the Ganges Canal Falls has been great, and the other two forms are much preferred on the Baree Doab Canal. Possibly a more flat ogee, such as those drawn in Plate XIV., would have answered.

The form of Drop Fall used on the Baree Doab Canal was adopted by Captain Dyas, the Director of Canals in the Punjab, after experiments made on the old Huslee Canal, carrying 250 cubic feet of water per second; and I understand that they have been found to answer perfectly on the Baree Doab Canal, which is to carry 3,000 cubic feet per second. The full supply of water has not as yet been admitted; but no apprehensions are entertained of

the plan not answering with the full discharge I extract below Captain Dyas's remarks on this subject in submitting the revised estimates for the Barce Doab Canal —

“The experimental observations on falls, for instance, were not completed till last hot weather. Some of the details are yet wanting, but sufficient details for the estimate have been obtained. The result is found in the design for the Dhumrace Fall (No 21), annexed to the revised estimate. I believe this description of fall will be found to be the cheapest yet adopted, both in original construction and in after repairs. With one exception all the falls are designed on this plan. It will be seen, from reference to the plan, that the water is made to fall vertically through a grating laid at a slope (here about 1 in 3), and that its action on the surface below is thus spread over as large an area as may be wished, owing to the several filaments of water being separated by the bars, much air is carried down with the water, and the action below is reduced to a minimum. The bars laid longitudinally (with the stream), at their lower ends which rest on the crest of the fall, they are close together, and the upper end, they are about 0.2 apart. The teeth of comb give a good idea of the arrangement. It was my intention to have had iron bars, T shaped, but the cost was found to be rather heavy, and wooden bars have been substituted in the estimate. As these bars can with ease be shifted singly, and renewed as often as may be necessary, at a small expense I do not see any objection to the use of wood here. Although ordinarily it is objectionable in a permanent work. From the slope of the bars and the way in which they are laid the spaces between them widening both in the direction of their length and at right angles to that direction, it is evident that small substances rolled down by the current will have no tendency to stick between the bars. As the substances are forced onwards by the current they find a gradually increasing space to pass through, and practically, they either do pass through or they are rolled over the top of the grating, which is a foot or so below the full supply level, a path way is arranged right across the fall, and close in front of the grating, so that any rubbish which may accumulate on the grating, when the water in the canal is lower than the full supply level, may be raked off. But

bed; under the nature of the material with which we are forced to construct our buildings; and under a continuous flow of water equal to that which I have noted above, the perpendicular fall would be inapplicable; it would, in my opinion, be expensive and dangerous; and further than this, I cannot imagine that floorings made of brick would for any length of time be able to withstand the concussion, and the violent action of the water in the reservoir.

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supposing that there were no one at hand to rake it off, and that the grating become choked, the water would merely rise until it could pour over the top of the grating, and the rubbish would be swept over with it.

“43.—This kind of fall is intended for complete falls, in which the height of the fall is not less than the depth of water in the canal, although it may be applied to ‘incomplete’ falls as well. For incomplete falls some experiments have been made by Lieut. Crofton on a syphon fall proposed by him, the water being compelled to pass down under a beam of wood or masonry, by which means its velocity is much checked, and the action confined to a short length of channel, which, being properly protected by masonry flooring and sides, delivering the water to the earthen channel at a moderate velocity.

“44.—It is evident that no accidents can happen from timber or boats going over these falls, and that the velocity of the water in its approach to the falls is not at all accelerated. Lock channels may, therefore, be shortened with safety. Repairs also can be executed with facility, as the length of the fall is divided into a number of openings of 10 feet each, and any one of these openings may be shut off while the canal is running.

“45.—The grating arrangement occurred to me while experimenting on a vertical fall (No. 17) built without a grating; the action in the water below, concentrated in a small space of about a foot wide along the whole length of the fall, appeared to me dangerous, notwithstanding the interposition of body of water 8 feet deep between the falling water and the flooring, and I have, within the last few days, heard from the Superintendent of the Dhoon Canals, that the cutting action of the water on the side walls of the vertical falls built in those canals has done much damage.”

The last form, and which has also answered well, is that of a Rapid, proposed originally by Lieut. Crofton, Superintendent of the Baree Doab Canal. It consists (as finally approved) of a slope of 15 base to 1 height, on which, and for an equal distance below, boulders are packed dry between dwarf walls, also of boulders, but cemented, of which the top is level with the bed of the canal. These walls are about 40 feet apart, both longitudinally

and across stream. Although the plan has answered perfectly, it is an essential condition to its being practicable that there should be an abundant supply of boulders within a short distance, so as to make the material cheap at the works.

I could not adopt this latter plan as a general one, because the Soane Canals will have the greater number of their falls too far from the hills to be within reach of cheap stone. This plan might be adopted at Kuroundea, and at a few other places, in preference to the Drop Falls I have proposed.

It was my intention to have adopted the Baree Doab Canal design of Drop Fall exactly, but the great number of falls required for the Soane Canals, and the comparatively small body of water to be dealt with, induced me to seek for a cheaper plan, and left me at liberty to adopt one having less massiveness than would have been necessary with larger bodies of water.

Fortunately the Soane Canals will require no falls on the main lines. The largest channel (Upper Sasseram Branch) upon which falls will be required is to carry 1,000 cubic feet per second, and as we may depend upon the waste weirs of the double locks to carry off 410 cubic feet of this, there remain only 650 cubic feet per second to be dealt with on the main fall. There will be larger bodies of water to deal with on the escape lines of the main canals, but these will only flow occasionally, and will consequently require much less precaution than the constantly flowing stream of a large canal.

I have therefore dispensed with the first set of separate chambers of 10 feet wide, given in the Baree Doab Canal plan, and have admitted the cascade at once into the large open basin, which I have extended in size and provided a deeper cushion of water to receive fall, see Plate XIV. Also by widening the canal channel considerably above the fall, the depth of water over the sill will be reduced to 2 feet, making the actual fall only 4 feet from surface to surface. Under these circumstances I have also dispensed with the grating. Our upper falls will be of rubble stone masonry, and if the action of the water on this, or on the brick work lower down the canals, be found severe, it will be easy to replace the facing of the revetment under the fall by

cut-stone work as a repair, using the water carriage of the canal to bring the material cheaply to site. The cost of this arrangement for a fall of 60 feet water way will be about Rs. 20,000; see Estimate No. 10, and the Table at page cii. of the Appendix.

I have placed the bridge for cross communication on the tail of the fall instead of at the head, which is in itself a saving of expense. In this, and in the non-division of the bason, I give up the power of closing the fall partially, by stopping one or more arches of the bridge in case of repairs being urgently required; but this is not of great importance, as even in the case of the largest fall we can pass more than half of the supply of the canal over the waste weirs of the locks, leaving the main fall dry for repairs, provided there be an arrangement for totally closing the main channel at the lock channel heads.

For this purpose I have adopted barrier bridges of masonry; see Plate XVI. On the subject of closing the entrance to the main canal above the falls, Sir P. Cautley writes:—

“It was very clear that to consider the main line as a navigable one, with the prospect of boats or rafts being brought in contact with the falls, was unreasonable. It mattered little whether through carelessness or accident boats were overwhelmed in these cataracts.

“Catastrophes of this sort were to be avoided. The notorious apathy of native boatmen was well known; the carelessness and neglect of Establishments were contingencies of too frequent occurrence to be treated with indifference; and the possibility of craft passing the navigable head, and proceeding onwards towards the falls, was obviously a matter to be guarded against. It was a case in which no half measures would answer, and one in which the prevention to danger ought to be so certain that no reasonable contingency should be likely to defeat it.”

Sir Proby proposed to use bridges of boats attached to the masonry heads of the lock channels.

In practice, however, on the Ganges Canal no barrier has been yet found necessary, and no accidents have happened. The simple masonry barrier bridge which I have designed, however, will cost little, and affords a convenient means of stopping the flow of water over the fall. The cost of a bridge of 30 feet water-way,

such as is suitable above the 60 feet fall, is about Rs 3,700, including the masonry work for the lock channel heads

For the small channels which are not to be used for navigation except for the smallest boats, a barrier above the falls will be unnecessary. In those narrow channels it would be hardly possible for a boat to be carried over. It would stick at the sill of the fall. The water-way of the fall may, however, in these cases be closed by planks fitted to grooves above the fall.

The plan of Lock is adopted almost without alteration (except as regards foundations) from the Ganges Canal designs. Indeed I have hardly made as much reduction as I might have done to suit the smaller depth of water to be dealt with in the Soane Canals. The lock channels in the Ganges Canal are 15 feet wide at bottom, and leave the main canal 1,500 feet above the falls rejoining 4,000 feet below them.

To pass now from the designs to general arrangement of the works for overcoming the excess of declivity on the canal lines without interrupting navigation, I must first remark I am informed by Colonel Baird Smith that already the traffic on the Ganges Canal feels the want of double locks, and wider channels to pass conveniently the up and down traffic. I therefore at first proposed to give two locks with separate channels right and left of the main canal, as shown in the diagram to Plate XV. This would probably be a more convenient arrangement for the traffic than to place both locks on a single but wider channel.

Considerations of economy have however induced me to adopt the latter arrangement. Where it is an object to pass as much water as possible by the waste channels, I adopt a construction of two locks in the centre with a waste channel on each side. This is a double lock with double waste channel. Where the discharge of water is less, two locks with a single waste channel between them may be used. This is a double lock with single waste channel.

This change of arrangement will require a slight alteration in the design for the barrier bridge, enlarging the masonry passage for the lock channel head on one side, and reducing it to form a Distributary channel head on the other.



It will be seen in Estimate No. 11, A, B, and C, that the cost of these arrangements severally is—

Single lock Rs. 23,500 to 31,800; on the average 27,500.

Double lock with single waste channel Rs. 32,000 to 44,300; on the average 38,000.

Double lock with double waste channel Rs. 37,800 to 51,400; on the average 44,600.

The cost of a lock channel to unite the single lock with the main canal, as in the diagram in Plate XV., is about Rs. 7,000; and it will be easily deduced that a channel 20 feet wide on the floor, for the double locks, would cost Rs. 9,000 at the same rate.

(It will be well to keep the bed of the lock channel at a level from the barrier bridge to the lock, and to let it have the fall of the main canal from below the lock to the junction.)

The waste channels of the locks will, as already said, carry 220 cubic feet per second each over the weir, if taken at  $3\frac{1}{2}$  feet depth or kept at that by means of the planks. None of the large locks will discharge less than that when the planks are open. Hence we may always be able to dispose of that quantity of water by means of each waste channel.

Wherever we have a double waste channel, therefore, we shall only have to provide at the falls for the difference between a flow of 440 cubic feet per second and that of the canal. The only canals (excepting the main one, on which no locks on falls are required) which have a discharge of more than 440 cubic feet per second are—

|                               |              |                       |       |       |
|-------------------------------|--------------|-----------------------|-------|-------|
| The Sasseram Branch, upper    | 1,091        | cubic feet per second |       |       |
| The Buxar Branch, upper       | 669          | ditto                 | ditto |       |
| The Arrah Branch, upper reach | 877          | ditto                 | ditto |       |
| Ditto                         | second ditto | 576                   | ditto | ditto |
| The Patna Branch, first part  | 738          | ditto                 | ditto |       |
| Ditto                         | second ditto | 659                   | ditto | ditto |
| Ditto                         | third ditto  | 532                   | ditto | ditto |

The excess above 440 feet per second in the 4th and 7th of these may easily be made to pass over the waste weirs of the lock

channels with  $4\frac{1}{2}$  feet depth of water, or by giving, if thought desirable, a slight increase of width to the waste weir. For these channels therefore no separate lock channel and no fall will be requisite; the locks may be placed in the canal itself. But for the other five branches there will be required separate falls, as follows:—

|                                                |     |
|------------------------------------------------|-----|
| Sasseram Branch, fall of 60 feet water-way     |     |
| Arrah upper ditto, ditto                       | 50  |
| Patna upper ditto, ditto                       | 40  |
| Buxar, and 2nd portion of Patna Branches, each | 30. |

The cost of the whole works, for these seven branches, at each fall would thus be—

*Sasseram Branch.*

|                                          |     |     |           |
|------------------------------------------|-----|-----|-----------|
| Barrier Bridge of five spans             | ... | ... | Rs. 3,700 |
| Fall 60 feet water-way                   | ... | ... | " 20,000  |
| Double lock with double waste channel... |     |     | " 41,600  |
| Navigable channel for ditto              | ... | ... | " 9,000   |
|                                          |     |     | <hr/>     |
| Total Rs.                                |     |     | 77,300    |
|                                          |     |     | <hr/>     |

*Arrah Branch, first portion.*

|                                        |     |     |           |
|----------------------------------------|-----|-----|-----------|
| Barrier Bridge of four spans           | ... | ... | Rs. 3,500 |
| Fall 40 feet water-way                 | ... | ... | " 15,500  |
| Locks with navigable channel, as above |     |     | " 53,600  |
|                                        |     |     | <hr/>     |
| Total Rs.                              |     |     | 72,600    |
|                                        |     |     | <hr/>     |

*Patna Branch, first portion.*

|                              |     |     |           |
|------------------------------|-----|-----|-----------|
| Barrier Bridge of four spans | ... | ... | Rs. 3,500 |
| Fall 40 feet water-way       | ... | ... | " 11,500  |
| Locks and channel as above   | ... | ... | " 53,600  |
|                              |     |     | <hr/>     |
| Total Rs.                    |     |     | 68,600    |
|                              |     |     | <hr/>     |

*Patna Branch, second portion, and Buxar Branch, upper portion.*

|                                      |           |
|--------------------------------------|-----------|
| Barrier Bridge of three spans ... .. | Rs. 3,300 |
| Fall 30 feet water-way ... ..        | " 7,500   |
| Locks and channel, as above ... ..   | " 53,600  |
| <hr/>                                |           |
| Total Rs.                            | 64,400    |
| <hr/>                                |           |

while for the third portion of the Patna, and second portion of the Arrah Branches the expense at each fall would be for the locks only, or Rs. 44,600.

The expense will be the same for the other branches on the main navigable lines where the discharge is not less than 300 cubic feet per second.

For the channels on the main navigable lines where the discharge is less than 300 cubic feet per second, we may adopt the cheaper arrangement of a single waste channel between two locks, at a cost, on the average, of Rs 38,000.

But besides the main navigation lines there will be many other branches, down to the VIIIth Class channels inclusive, in which, the full supply depth of water exceeding  $2\frac{1}{2}$  feet, some sort of navigation will be practicable. It would be out of the question to allow for these locks on the same expensive scale as those above given, but it would be a pity to suffer the navigation to be lost for want of locks at the numerous falls it will be necessary to give. For these branches I have proposed a lock of 60  $\times$  10 feet chamber, with a waste channel from 10 to 4 feet wide, of which the cost will be, on the average, about Rs. 6,500. (See Estimate No. 11 E, page exvi. of the Appendix.) I may remark here that the only branch not on the four main navigable lines of which the discharge could not be carried off by such a lock is the upper part of the Tikaree Branch, which is to be laid out so as not to require any fall.

I have not yet mentioned the Corn Mills which it is intended to place at each Lock and Fall. They are designed after the plan of those on the Ganges Canal, as drawn attached to the locks in Plate XV. The plan is a native one, which was adopted by Sir Proby Cautley as cheap and simple, and answering sufficiently well in

cases where there is an ample supply of water, and where the fall is 3 feet or more. The machinery has been drawn and described in detail by Sir Proby in the Journal of the Asiatic Society of Bengal for 1833, and in his recent Report.

Two mills with six pairs of stones will cost by the Estimate No. 11 D, Rs. 2,150. A single mill of the same description with three pairs of stones attached to a fall or lock, would cost about Rs. 1,300. I have proposed to add two mills to each of the large locks, 120 x 16 feet, and one to each of the small locks, and to each of the falls without locks on the minor channels.

Before leaving the subject of locks and falls, it will be proper to show how much the cost of the works is enhanced by the provision of the former in addition to the latter; that is, to state the cost properly chargeable to the navigation.

| Canal Branches.                                           | If falls only were provided. |          | Total charge for locks and falls. | Excess of cost due to navigation. |
|-----------------------------------------------------------|------------------------------|----------|-----------------------------------|-----------------------------------|
|                                                           | Water-way.                   | Cost Rs. | Rs.                               | Rs.                               |
| Basseram Branch ... ..                                    | 100                          | 35,000   | 77,300                            | 42,300                            |
| Arrah Branch, 1st ... ..                                  | 80                           | 27,000   | 72,600                            | 45,600                            |
| Patna ditto ... ..                                        | 70                           | 23,000   | 68,600                            | 45,600                            |
| Patna branch, 2nd part, &c. ...                           | 60                           | 20,000   | 61,400                            | 41,400                            |
| Main navigable channels of 580 to 300 feet discharged ... | 40                           | 15,500   | 41,600                            | 29,900                            |
| Ditto below 300 ditto ...                                 | 30                           | 7,500    | 3,8000                            | 3,0500                            |
| Ditto where only one lock is required ... ..              | 25                           | 5,500    | 27,500                            | 22,000                            |
| Ordinary lines VIIth Class ...                            | 25                           | 5,500    | 6,500                             | 1,000                             |
| Ditto VIIIth Class ...                                    | 20                           | 4,000    | 6,500                             | 2,500                             |

The sums in the last column only will be entered as chargeable to navigation in the estimate, and the rest as part of the necessary charge for the canal as a work of irrigation alone.

For the IXth and Xth Classes of channel the falls will be of 10 and 7 feet water-way, costing Rs. 2,000 and 1,000 respectively.

#### SECTION XI.—BRIDGES AND BRANCH HEADS.

All the bridges on the four main navigable lines of canal are designed with 13 feet head-way for boats, and a tow-path of 6 feet wide on each side, within the arch of the bridge. These provisions render the bridges more expensive than they otherwise

*Patna Branch, second portion, and Buxar Branch, upper portion.*

|                                      |           |
|--------------------------------------|-----------|
| Barrier Bridge of three spans ... .. | Rs. 3,300 |
| Fall 30 feet water-way ... ..        | " 7,500   |
| Locks and channel, as above ... ..   | " 53,600  |
| <hr/>                                |           |
| Total Rs.                            | 64,400    |
| <hr/>                                |           |

while for the third portion of the Patna, and second portion of the Arrah Branches the expense at each fall would be for the locks only, or Rs. 41,600.

The expense will be the same for the other branches on the main navigable lines where the discharge is not less than 300 cubic feet per second.

For the channels on the main navigable lines where the discharge is less than 300 cubic feet per second, we may adopt the cheaper arrangement of a single waste channel between two locks, at a cost, on the average, of Rs 38,000.

But besides the main navigation lines there will be many other branches, down to the VIIIth Class channels inclusive, in which, the full supply depth of water exceeding  $2\frac{1}{4}$  feet, some sort of navigation will be practicable. It would be out of the question to allow for these locks on the same expensive scale as those above given, but it would be a pity to suffer the navigation to be lost for want of locks at the numerous falls it will be necessary to give. For these branches I have proposed a lock of 60 x 10 feet chamber, with a waste channel from 10 to 4 feet wide, of which the cost will be, on the average, about Rs. 6,500. (See Estimate No. 11 E, page cxvi. of the Appendix.) I may remark here that the only branch not on the four main navigable lines of which the discharge could not be carried off by such a lock is the upper part of the Tikaree Branch, which is to be laid out so as not to require any fall.

I have not yet mentioned the Corn Mills which it is intended to place at each Lock and Fall. They are designed after the plan of those on the Ganges Canal, as drawn attached to the locks in Plate XV. The plan is a native one, which was adopted by Sir Proby Cautley as cheap and simple, and answering sufficiently well in

crises where there is an ample supply of water, and where the fall is 3 feet or more. The machinery has been drawn and described in detail by Sir Proby in the *Journal of the Asiatic Society of Bengal* for 1833, and in his recent Report.

Two mills with six pairs of stones will cost by the Estimate No 11 D, Rs 2,150. A single mill of the same description with three pairs of stones attached to a fall or lock, would cost about Rs 1,300. I have proposed to add two mills to each of the large locks 120 × 16 feet, and one to each of the small locks, and to each of the falls without locks on the minor channels.

Before leaving the subject of locks and falls, it will be proper to show how much the cost of the works is enhanced by the provision of the former in addition to the latter, that is, to state the cost properly chargeable to the navigation.

| Canal Branches                                        | If falls only were provided |         | Total charge for locks and falls | Excess of cost due to navigation |
|-------------------------------------------------------|-----------------------------|---------|----------------------------------|----------------------------------|
|                                                       | Water way                   | Cost Rs | Rs                               | Rs                               |
| Basseram Branch                                       | 100                         | 35 000  | 77 300                           | 42 300                           |
| Arrah Branch 1st                                      | 80                          | 27 000  | 72 600                           | 45 600                           |
| Latna ditto                                           | 70                          | 23 000  | 68 600                           | 45 600                           |
| Latna branch 2nd part &c                              | 60                          | 20 000  | 64 400                           | 44 400                           |
| Mains navigable channels of 550 to 300 feet & charged | 40                          | 15 500  | 44 600                           | 29 900                           |
| Ditto below 300 ditto                                 | 30                          | 7 500   | 38 000                           | 30 000                           |
| Ditto where only one lock is required                 | 25                          | 5 500   | 27 500                           | 22 000                           |
| Ordinary lines VIIth Class                            | 25                          | 5 500   | 6 500                            | 1 000                            |
| Ditto VIIIth Class                                    | 20                          | 4 000   | 6 500                            | 2 500                            |

The sums in the last column only will be entered as chargeable to navigation in the estimate, and the rest as part of the necessary charge for the canal as a work of irrigation alone.

For the IXth and Xth Classes of channel the falls will be of 10 and 7 feet water way, costing Rs 2,000 and 1,000 respectively.

#### SECTION VI — BRIDGES AND BRANCH HEADS

All the bridges on the four main navigable lines of canal are designed with 13 feet head way for boats, and a tow path of 6 feet wide on each side, within the arch of the bridge. These provisions render the bridges more expensive than they otherwise

would be, especially the former, which adds greatly to the cost of the wing walls and earthen ramps of approach.

The Distributary channel heads, and drainage inlets attached with so much elegance of design by Sir Proby Cautley to the bridges in his plans for the Ganges Canal, and which have been followed in the Baree Doab Canal, I have not adopted. They have, I believe, been found to tend to inconvenience in practice. It is now deemed better to have detached heads for the Distributaries, which leaves the Canal Engineer more at liberty to choose for them the best positions, and it is found better to keep the drainage as much as possible out of the canal. I have therefore deviated from the established designs in these matters, under the sanction of Colonel Baird Smith's judgment.

The following Table shows the sizes and cost of the bridges, for further details regarding which I refer to Plates XVII. and XX. and to Estimates Nos. 13 A to G in the Appendix.

| Denomination.                  | SPANS. |        | Cost of Bridge. | REMARKS.                                                                                |
|--------------------------------|--------|--------|-----------------|-----------------------------------------------------------------------------------------|
|                                | No.    | Width. |                 |                                                                                         |
|                                |        |        | Rs.             |                                                                                         |
| For deep cutting Western Canal | 5      | 33     | 26,500          | These designs are adapted to navigation with 13 feet head-way and two 6 feet tow-paths. |
| Ditto ditto Eastern ditto ...  | 4      | 37     | 23,500          |                                                                                         |
| Class I ... ..                 | 3      | 33     | 19,000          |                                                                                         |
| Class II ... ..                | 2      | 37     | 16,000          |                                                                                         |
| Class III ... ..               | 2      | 33     | 14,000          |                                                                                         |
| Class IV ... ..                | 2      | 28     | 10,000          |                                                                                         |
| Class V ... ..                 | 1      | 44     | 9,000           |                                                                                         |
| Class VI ... ..                | 1      | 37     | 8,000           |                                                                                         |
| Class VII ... ..               | 1      | 28     | 6,000           |                                                                                         |
| Class VIII ... ..              | 1      | 22     | 2,300           |                                                                                         |
| Class IX ... ..                | 1      | 16     | 1,700           |                                                                                         |
| Class X ... ..                 | 1      | 10     | 1,400           |                                                                                         |

The width of road-way given to these bridges is only 16 feet for ordinary village communication. For district roads I allow 25 per cent., and for the trunk road 50 per cent. additional cost to provide greater width.

Lines of steps have been added both above and below the bridge as a protection to the banks.

The water way allowed is exactly the same area of section as on the canal with a full supply

For the smaller channels (Classes Nos IX and X) when the depth of water is less than two feet, I do not allow any bridges for mere village communication, but provide Metalled Fords such as will be found described in the Estimate for the Distributary Channels, No 15 in the Appendix. The cost as will be seen by inspection will be Rs 120 for the Channel Class X and Rs 150 for Class IX.

The material for the bridges must be undressed stone or brick, according to locality, but I have allowed a little cut stone work for the ornamental parts of those bridges which are built of stone. The rise of the arch is universally  $\frac{1}{4}$ th of the span, which will require care in turning the arch when of undressed stone. If it be found difficult to get the arches turned in rubble, brick may be substituted. But as the sandstone quarries well, and the masons have been accustomed to build large rubble arches on the Grand Trunk Road, I do not apprehend any great difficulty. The additional cost of making the arches of cut-stone would not be very heavy,—about Rs 500 for each arch of the larger bridges, but the delay in getting the stone cut would be great.

The centerings of the arches should be constructed of earth as explained in the following extract —

“The arches of all the bridges extending from the 47th to the 110th mile were built on centerings of earth only, \* \* \*

“With the exception of eight bridges at the lower extremity of the line on which this species of centering was used, the canal channel had, previously to the construction of the arches, been entirely cleared out and excavated, this was rendered necessary from the sandy nature of the soil, which did not admit of rectangular sided excavations for piers and abutments, on the contrary, to prevent accidents from the subsidence of the sides, it was a matter of the utmost expediency to excavate in long slopes, and during the progress of the building of either the foundations of the piers and abutments, or of the curtain walls lying intermediately to carry on a gradual process of falling in,



“the level of each day’s work in masonry being met by a corresponding level in the replacement of the earth. \* \* \*

“The course of proceeding in all the abovementioned cases was as follows:—To complete the excavation of the canal, to finish the substructure of the bridge in all its parts (with exception to the bay floorings) up to the level of the top of the impost blocks; to fill the bays with earth, as shown in the preceding diagram; to form the upper part of the surface in the desired curve, and upon it to build the arch.” Sir P. Cautley’s Report on the Ganges Canal, vol. II., page 202.

The result was great economy. A specimen is given, page 236, of the rates per 100 cubic feet of brick work—Plain work Rs. 11-0-8; Arch work Rs. 14-9-0. This was in a large division of bridges. There was some settlement, and cracking near the haunches, but it was slight, and quite immaterial compared with the economy of the method.

The comparatively greater height of the bridges for the Soane Canals will require a comparatively higher rate for arching; but I believe Rs. 25 against 15 for ordinary masonry will prove ample.

There being in these estimates no provision for letting into the canal the drainage arrested by the embankments of approach to the bridges, it will be necessary to provide culverts for the purpose of passing it forward. These are included in Estimates No. 13 H and K. Two of the 4-feet culverts at Rs. 470 each, or Rs. 940 per bridge, will be used for each of the bridges down to Class VII., and the smaller culverts at Rs. 200 for each culvert, or Rs. 400 per bridge for the bridges of smaller size.

Having decided on providing tow-paths within the arches to all the ordinary bridges, I have not thought it necessary to make exceptions of those to be used as Regulators at the Branch Heads. These bridges are designed exactly the same as the others, with the addition of a redan-shaped cut-water of steps between them, to part the water towards the two channels, and an increased width of flooring below, to receive the scour due to the application in part of the regulating stop boards.

The regulating apparatus itself has been changed from the ordinary design to suit the bridges with tow paths. For these, drop gates, though they may be used, seemed to me inconvenient, and I have proposed perpendicular stop planks resting against beams. The whole arrangement is shown in Plate XVIII.

An escape is allowed above each bifurcation, of sufficient capacity to lay both the lower channels dry. Where the object is to diminish the supply of water in both, therefore, it will be unnecessary to do more than open the requisite number of bays of the escape bridge. But when it is desired to keep up the whole supply in one channel, and reduce it, or altogether to cut it off, in the other, it will be necessary to drop the sill beam in by the grooves, using the blocks and tackling (in the deep channels) for the end towards the pier, and afterwards to fix the upper beam in its seat by the same means. After this, using the upper beam as a bridge, the stop boards will be applied by hand, to such extent as may be desired.

The plan will not be so expeditious as that of the drop gates and windlasses. But it will, I believe, provide in a simple way all that is wanted. The use of a few long drop boards, such as could be let down from the parapet of the bridge, would enable us to partially close the openings without stopping navigation. The same object might be attained by the use of a frame for supporting a shorter upper beam in the water-way.

## SECTION XII — DISTRIBUTARIES

It has become a principle in managing the irrigation canals in Northern India, that no water shall be taken by the cultivators directly from the canals, but that they shall be supplied only from Main Distributary water-courses called by the natives *Rybhias*. These *Rybhias* carry from 80 to 5 cubic feet per second according to the features, extent, and position of the land they are intended to irrigate, and from these are drawn the village water-courses for the immediate use of the cultivators. In this system we may, as Sir P. Cautley remarks, consider the canal as answering to the reservoir or supply channel in the water supply of towns, the *Rybhias* or Distributaries as the "Mains," and the village water-courses as the "Service" channels.

The village water-courses are always constructed at the expense of, and by the cultivators; and the waste of water that arose from their ignorant attempts to carry channels for long distances was one of the inconveniences that led to the adoption of the Rajbuha system, in which these Main Distributaries are laid out at the best levels, and constructed by the Canal Engineers. The expense used formerly to be advanced originally by the Government, and subsequently recovered by instalments from the cultivators. Latterly, however, it has been decided that the Government shall bear all the expense of construction and repair of these works, charging an enhanced rate of water-rent to cover it. The rate of increase proposed and sanctioned is Rs. 100 per cubic foot per second of the canal discharge, but of this I shall say more when I come to treat of the returns derivable from the works.

Now in applying this system to the projected Soane Canals, a difficulty at once presents itself in the already minute sub-division of channels. Many of these are already of less size than some of the Rajbhuas of the Ganges Canal. When shall the canal be considered as being merged in the Rajbuha?

After consulting Colonel Baird Smith on the subject I have taken the following rules for my guidance:—

I. No village water-course shall be drawn direct from any canal of which the discharge is more than 70 cubic feet per second.

II. Rajbhuas shall be provided, in addition to the smaller Canal channels, to such extent as shall be necessary to bring the water within 3 miles of every part of the country to be irrigated; so that no village water-course need be made more than 3 miles long at the most.

The cost of the Rajbhuas on the Ganges Canal is about Rs. 1,000 per mile. I have made up an estimate, from examples of works, intended to be the average of what will be required, which comes to about Rs. 1,300 per mile, including the cost of land. In this I provide, by Colonel Baird Smith's advice, two heads to each Rajbuha. The silt deposits which take place in these works, especially when at a low slope of bed, do not extend for more than a mile down the channel, and by providing a double head and

double channel in the first mile, we have the means of carrying on the irrigation, without interruption from this cause

Plate XXI is intended to illustrate the system of Raybuhas or distributary channels. Figure 1 is a diagram showing the mode of laying out the channels. A and B show the methods ordinarily used in Northern India where the slope of the country seldom admits of the waters of the Raybuh being returned into the canal. C and D show methods by which this latter desideratum may be obtained under the slope of the plains of Shahabad and Behar. But the Engineer must be careful not to attempt to be too systematic, but to be guided by his own ingenuity and the nature of the ground in each case.

It appears to me that it will be found a good principle in administration to keep each Raybuh distinct from every other (when it can be managed), from its head to its terminus, so that the expenditure of water on each Distributary may be separately ascertained and checked, being measured both on its issue at the head and on its return at the tail fall into the canal.

C, in the diagram, gives an example how this may be done in a case where the canal is too far in soil to afford water at a proper level to irrigate close to its banks. The Raybuh gets to a proper level for irrigation at b, b', &c, passing there over a syphon or fall conveying the returning upper Raybuh which from loss of level in the crossing does not irrigate again till it comes to d, d', &c, when it passes over the Raybuh next but one below it, and irrigates the land close to the canal bank, ere it returns by a drop into the canal. An arrangement of this kind could only be effected with a very good fall of country.

The remainder of Plate XXI hardly requires explanation, except in regard to the Raybuh heads and village water-course heads, which are on the plan of the Italian Modules for measuring water. The system is to reckon the water by the discharge under a given head, which is known by the ordinary hydraulic rules, either (1) when the discharge takes place freely into the air, or (2) when it is simply a descent from a upper to a lower level.

The village water-courses are always constructed at the expense of, and by the cultivators; and the waste of water that arose from their ignorant attempts to carry channels for long distances was one of the inconveniences that led to the adoption of the Rajbuha system, in which these Main Distributaries are laid out at the best levels, and constructed by the Canal Engineers. The expense used formerly to be advanced originally by the Government, and subsequently recovered by instalments from the cultivators. Latterly, however, it has been decided that the Government shall bear all the expense of construction and repair of these works, charging an enhanced rate of water-rent to cover it. The rate of increase proposed and sanctioned is Rs. 100 per cubic foot per second of the canal discharge, but of this I shall say more when I come to treat of the returns derivable from the works.

Now in applying this system to the projected Soane Canals, a difficulty at once presents itself in the already minute sub-division of channels. Many of these are already of less size than some of the Rajbuhās of the Ganges Canal. When shall the canal be considered as being merged in the Rajbuha?

After consulting Colonel Baird Smith on the subject I have taken the following rules for my guidance:—

I. No village water-course shall be drawn direct from any canal of which the discharge is more than 70 cubic feet per second.

II. Rajbuhās shall be provided, in addition to the smaller Canal channels, to such extent as shall be necessary to bring the water within 3 miles of every part of the country to be irrigated; so that no village water-course need be made more than 3 miles long at the most.

The cost of the Rajbuhās on the Ganges Canal is about Rs. 1,000 per mile. I have made up an estimate, from examples of works, intended to be the average of what will be required, which comes to about Rs. 1,300 per mile, including the cost of land. In this I provide, by Colonel Baird Smith's advice, two heads to each Rajbuha. The silt deposits which take place in these works, especially when at a low slope of bed, do not extend for more than a mile down the channel, and by providing a double head and

double channel in the first mile, we have the means of carrying on the irrigation, without interruption from this cause

Plate XXI is intended to illustrate the system of Rajbuhās or distributary channels. Figure 1 is a diagram showing the mode of laying out the channels. A and B show the methods ordinarily used in Northern India, where the slope of the country seldom admits of the waters of the Rajbuhā being returned into the canal. C and D show methods by which this latter desideratum may be obtained under the slope of the plains of Shahābad and Behār. But the Engineer must be careful not to attempt to be too systematic, but to be guided by his own ingenuity and the nature of the ground in each case.

It appears to me that it will be found a good principle in administration to keep each Rajbuhā distinct from every other (when it can be managed), from its head to its terminus, so that the expenditure of water on each Distributary may be separately ascertained and checked, being measured both on its issue at the head and on its return at the tail fall into the canal.

C, in the diagram, gives an example how this may be done in a case where the canal is too far in soil to afford water at a proper level to irrigate close to its banks. The Rajbuhā gets to a proper level for irrigation at b, b\*, &c. passing there over a syphon or fall conveying the returning upper Rajbuhā which from loss of level in the crossing does not irrigate again till it comes to d, d\*, &c., when it passes over the Rajbuhā next but one below it, and irrigates the land close to the canal bank, ere it returns by a drop into the canal. An arrangement of this kind could only be effected with a very good fall of country.

The remainder of Plate XXI hardly requires explanation, except in regard to the Rajbuhā heads and village water-course heads, which are on the plan of the Italian Modules for measuring water. The system is to reckon the water by the discharge under a given head, which is known by the ordinary hydraulic rules, either (1) when the discharge takes place freely into the air, or (2) when it is simply a descent from a upper to a lower level.

My plan of module is adapted to the latter method. In both cases the front sluice board is used to admit such a supply as shall just keep the level of the water in the interior chamber at the mark denoting the desired head of supply. But on the village water-course heads it would be impossible to supervise the working of the head sluice board. It can only be used to shut off the supply when the water is not required. The level of these water-course heads must be so placed that when the intended supply of water is passing down the Rajbuha, every village water-course may just have its proper supply, as contracted for. The regulation must be attempted only at the Rajbuha head, and the Government will lose a portion of the tail surplus, and the other villages or cultivators gain it, when one or more villages or cultivators let their modules remain closed.

### XIII.—TERMINAL WORKS.

The Terminal works of all the escape channels and of all canals, except of the chief navigable lines, will be simple falls like the falls on the course of the channels themselves, dropping them to the level of the natural water-course into which they are to discharge their surplus waters.

But the chief navigable lines will end each in a double series of locks connecting them with the dry season level of the Ganges. The highest rise of the Ganges at Benares is about 41 feet above the dry season stream. But this height it attains only once in 10 or 20 years. However, it will be seen by the Sections to Plate II. that a descent of 30 or 40 feet will in all probability have to be accomplished. I have taken no steps as yet to obtain data for these descents, and have therefore prepared no design or estimate.

I have only to suggest that the descents near Benares might perhaps with advantage fall into the Jhurgoo, so as to avoid crossing the Railway. That at Chowsa may certainly be taken into the Kurrunnassa, which, with the addition of a supply of 150 cubic feet per second, would be quite navigable. That near Arrah I would propose not to attempt to carry to the Ganges at all, unless great inducement should offer, but to drop into one of the nalas near Arrah, south of the Railway, and render that navigable as far as

*the town* That near Patna should be carried into the Ganges if possible, but if the difficulties of crossing the Soane floods prove too great, it might be taken into the Poonpoo, and, if necessary, works constructed to make that river navigable in the dry season

It is necessary, however, to set down an adequate sum for these terminal works in an estimate of the cost of the whole project, and for this my only guide is the Ganges Canal estimate of 1850. The terminal works at Cawnpore are there set down at Rs 1,60,860, and those at Etawa at Rs 86,721. I believe the estimate for the Cawnpore works was greatly exceeded, partly from the addition of ornamental works, and partly from difficulties in the foundations. I think it will not be safe to estimate the cost of the terminal works of the Soane Canal navigable lines at less than  $2\frac{1}{2}$  lakhs each, except the Arrah works, for which  $1\frac{1}{2}$  lakhs will suffice. At Patna it will be necessary to add an additional lakh for compensation for buildings which will have to be removed. This will be in all Rs 10,00,000.

#### SECTION XIV—RATES AND COST OF WORKS

The rates for masonry and brick work in Shahabad and Behar have undergone considerable changes since the Railway works were put in hand, and since the occurrence of the mutiny, so that it is not very easy to determine, even setting aside the disturbing effect on the market of commencing large works like those now under consideration, what the actual prevailing rate now is.

The greater part of the drainage works west of the Soane, spoken of in the 11th paragraph of the Report of 1853, were completed at rates on the average below Rs 8 per 100 cubic feet for rubble stone masonry. The earth-work cost Rs 1-3-0 per 1,000 cubic feet. At a later date just before the mutinies, the viaducts on the Grand Trunk Road, for the passage of the floods of the Doorgowtee, were executed at a rate under Rs 10 per 100 cubic feet. The rates for brick-work in the neighbourhood of Dinapore and Patna were at the same period generally under Rs 9 per 100 cubic feet.



It is difficult to say what increase of rate will be necessary to attract a sufficient body of workmen, but I should say not less than the usual rate for a beldar in the North-Western Provinces, of 2 annas or 8 pice per diem. This will be an increase of 33 per cent. on the existing wages for unskilled labour.

In skilled labour the classes most required are stone-cutters, mason, and brick-layers. The prevailing rates for these artificers near the Grand Trunk Road has been 2 annas a day.

Sasseram is a place of note for stone-cutters, who also act as quarry-men. They get some employment in the town and neighbourhood for building purposes, and can always make a livelihood by making hand mill-stones in the hills. But after all, the number of these men to be had in the neighbourhood is not great, and the Government works on the road have often been retarded for want of a sufficient number of them.

There is a corresponding proportion of masons near the hills, where stone-work is cheap in consequence of the proximity of the material. But when we get beyond the neighbourhood of the hills, stone or brick buildings are seldom seen. The villages are almost wholly of mud huts with thatched, or sometimes tiled roofs, and the village temple or mosque, with occasionally a resident Zemindar's house, are the only brick or stone-buildings to be seen, besides the small drains constructed from the Road and Ferry Funds on the district roads. One might travel 20 miles without seeing a brick-building in progress; and where there is so little brick-work or masonry going on, there are of course very few brick-layers or masons. In fact these men are only to be had from towns at a distance. They are more apt to leave their homes to seek work than the unskilled labourers, but some inducement must be offered; and as the rates of wages for good workmen on the Government works at Benares and Allahabad is 3 annas a day, we cannot expect to get the men at a distance for less, on the average of good and ordinary workmen.

On the whole it will, I think, be necessary to reckon upon a rise in the labour market of 33 per cent. in order to attract a sufficient number of labourers to carry on the work vigorously.

But it is not only in labour but in materials also that prices will be affected. In the first place fuel of all kinds, and other sorts of local produce, such as can be had in the neighbourhood of the works, will soon be exhausted, and the cost of carriage must be paid to procure them from a distance. Secondly, there will be, when we get beyond the reach of the hills, the difficulty of establishing brick manufacture on a large scale where it has never been tried on a large scale before, and where time cannot be afforded for the gradual developement of the manufacture. Speaking of the Nuggaram Aqueduct in the Godavery Delta, Sir A. Cotton says, "I determined to try if possible to get the work out of the reach of injury before the monsoon. In doing this we could not let any means slip on account of their cost, and when we meet with difficulties, such as those in the burning of bricks, as mentioned in Lieutenant Haig's Report, we could not stop to make experimental kilns of a few thousand bricks. We were obliged to continue making and burning them by lakhs without losing a day. As is so commonly the case the difficulty was one we least expected, having a most intelligent and able Overseer, who had been just before burning bricks with the most perfect success at other works. But both he and the native brick burners were entirely at fault. I have no doubt that the principal cause of our failures was the peculiar nature of the soil, which was that in which the tobacco is grown, and had never been used for bricks. It evidently requires a much higher heat than ordinary brick-earth. I mention this as a specimen of the obstacles we met with in pressing on the work."

Brick manufacture has always been one of our great difficulties in regard to large works in India, and we are fortunate in the Soane Canals in having so much of the heavy work within reach of the excellent building stone of the Kymore hills, and the granite west of the Poonpoo.

In order to allow for the whole effect of the rapid execution of these works on the local markets, both in labor and materials, I think it will be proper to add to the estimate, framed on the present prevailing rates, a proportion of 30 per cent. If the works are carried out gradually, perhaps something may be saved on this

But there are other causes which in the case of the large irrigation works in Northern India, have led to excesses in actual cost of construction over estimates framed beforehand, which it will be well to review before finally presenting the estimate for the Soane Canal works.

The first of these is the occurrence of sand. On both the Ganges and Rares Doab Canals the expectations of the Engineers as to the cost of the works were disappointed by finding that the good soil on the surface extended to a depth of only 3 or 4 feet, and below that the whole of the soil was nearly pure sand over very large tracts of country. The cost of excavation is not affected by this, for although the width to be excavated is greater, the cost of excavation in sand is less. But it seriously affected the cost of the masonry works, in the increased massiveness of foundations it rendered necessary. To avoid all risk of having the estimates for the Soane Canals rendered insufficient from this cause, I have assumed that in half the works it will be necessary to adopt under-sunk foundations. This is not done under the supposition that such is at all likely to be the case, but as the most secure means of arriving at a "superior limit" to the probable expense.

Another cause of excess in the expenditure on the Ganges Canal was the order of Government, issued on sanitary grounds, that the surface of this canal should always be kept within soil. This my estimate provides for.

A third cause of excess over estimates is in the improvements and alterations dictated by local experience gained during the progress of the works. To refuse sanction to charges of this kind would be quite unreasonable. All we can do is to scrutinize proposals for such changes carefully, and see that none are admitted of which the origin is in mere fancy or caprice; and to administer blame where it appears to be deserved owing to want of care in the first estimate. But in India Engineers are peculiarly liable to be misled in many matters, from which the existence of similar works in the neighbourhood would save them in Europe. For instance we have there almost every river bridged above and below the intended crossing of a railway or canal, so that there can be no doubt as to the water-way to be given. But in India there is

generally no such guide, and the Engineer may examine and watch a river carefully for 9 years, and be surprised by a flood in the tenth, which far surpassed his highest expectations. From this cause arise frequent excesses over estimates. But I think the large provision for excess in the matter of foundations in the estimates for the Seine Canal works will cover the probable increase of expense from this source, considering that care has been taken always to over, rather than under estimate in doubtful cases.

I therefore conclude that an addition of 30 per cent will cover the probable excesses over the estimates which are likely to arise from the effect of the execution of these canals on the local markets, and that the estimates are, in all other respects, ample.

I now present an abstract of the General Estimate in which I include  $12\frac{1}{2}$  per cent on the cost of the works, for Establishments, including salaries, travelling allowances and contingent charges. This proportion is what it seems fair to allow with reference to the cost of the same branch of expenditure in other like works. The Estimates will be found in detail in Appendix B—

*Head Works*

|                                                  |           | 1 s       |
|--------------------------------------------------|-----------|-----------|
| Land                                             |           | 1 500     |
| Roads Fences and Plantations                     |           | 3 800     |
| Temporary Dam                                    | 2 21 100  |           |
| Permanent ditto                                  | 11 20 200 |           |
| Plant for ditto                                  | 2 50 000  |           |
|                                                  | <hr/>     | 10 03 739 |
| Western Head Bridge                              | 1 16 316  |           |
| Eastern ditto                                    | 31 102    |           |
|                                                  | <hr/>     | 1,50 809  |
| Western Lock Channel Head                        | 1 33 973  |           |
| Eastern ditto                                    | 60 151    |           |
|                                                  | <hr/>     | 1 04 124  |
| Temporary Quarters                               | 11 750    |           |
| Permanent ditto                                  | 62 000    |           |
| Workshops                                        | 50 000    |           |
|                                                  | <hr/>     | 1 24 750  |
|                                                  |           | <hr/>     |
|                                                  |           | 21 14 020 |
| Establishment at $12\frac{1}{2}$ per cent.       |           | 2 01,250  |
|                                                  |           | <hr/>     |
|                                                  |           | 23 75,270 |
| 41 30 per cent. to cover probable rise of prices |           | 6 31,200  |
|                                                  |           | <hr/>     |
|                                                  |           | 30 12 470 |
|                                                  |           | <hr/>     |
| Carried over                                     |           | 30 12,470 |

## RATES AND COST OF WORKS.

| <i>Western Canal Main Channel.</i>         |     |     |     |     | Rs.       | Rs.        |
|--------------------------------------------|-----|-----|-----|-----|-----------|------------|
| Brought forward ...                        |     |     |     |     | ...       | 30,12,478  |
| Land ...                                   | ... | ... | ... | ... | 10,560    |            |
| Roads, Fences and Plantations...           | ... | ... | ... | ... | 7,860     |            |
| Excavation ...                             | ... | ... | ... | ... | 5,73,381  |            |
| Drainage works, &c. ...                    | ... | ... | ... | ... | 3,55,380  |            |
| Falls (on escape) ..                       | ... | ... | ... | ... | 1,40,000  |            |
| Distributaries ...                         | ... | ... | ... | ... | 13,000    |            |
| Bridges ...                                | ... | ... | ... | ... | 1,29,000  |            |
| Accommodation for Establishment            | ... | ... | ... | ... | 15,925    |            |
|                                            |     |     |     |     | 12,45,106 |            |
| Establishment at 12½ per cent....          |     |     |     |     | 1,55,638  |            |
|                                            |     |     |     |     | 14,00,744 |            |
| Add 30 per cent. as before ...             |     |     |     |     | 3,73,532  | 17,74,276  |
| <i>Eastern Canal Main Channel.</i>         |     |     |     |     |           |            |
| Land ...                                   | ... | ... | ... | ... | 9,600     |            |
| Roads, Fences and Plantations ...          | ... | ... | ... | ... | 6,600     |            |
| Excavation ...                             | ... | ... | ... | ... | 4,46,709  |            |
| Drainage works, &c. ...                    | ... | ... | ... | ... | 1,68,295  |            |
| Falls (on escape) ...                      | ... | ... | ... | ... | 81,000    |            |
| Distributaries ...                         | ... | ... | ... | ... | 13,000    |            |
| Bridges.. ...                              | ... | ... | ... | ... | 1,84,500  |            |
| Accommodation for Establishment            | ... | ... | ... | ... | 15,800    |            |
|                                            |     |     |     |     | 8,75,004  |            |
| Establishment at 12½ per cent. ...         |     |     |     |     | 1,09,875  |            |
|                                            |     |     |     |     | 9,84,379  |            |
| Add 30 per cent. as before ...             |     |     |     |     | 2,62,501  | 12,46,880  |
| <i>Arrah Branch.</i>                       |     |     |     |     |           |            |
| Land ...                                   | ... | ... | ... | ... | 49,394    |            |
| Roads, Fences and Plantations ...          | ... | ... | ... | ... | 44,852    |            |
| Excavation ...                             | ... | ... | ... | ... | 5,09,813  |            |
| Works of drainage and regulation of supply | ... | ... | ... | ... | 1,14,250  |            |
| Falls ...                                  | ... | ... | ... | ... | 3,72,000  |            |
| Distributaries ...                         | ... | ... | ... | ... | 8,14,800  |            |
| Bridges and Fords ...                      | ... | ... | ... | ... | 2,63,674  |            |
| Accommodation for Establishment            | ... | ... | ... | ... | 1,16,100  |            |
| Locks ...                                  | ... | ... | ... | ... | 7,36,400  |            |
| Mills ...                                  | ... | ... | ... | ... | 54,700    |            |
|                                            |     |     |     |     | 30,75,983 |            |
| Establishment ...                          |     |     |     |     | 3,84,498  |            |
|                                            |     |     |     |     | 34,60,481 |            |
| Add 30 per cent. as before ...             |     |     |     |     | 9,22,795  | 43,83,276  |
| Carried over ...                           |     |     |     |     | ...       | 104,16,910 |

| <i>Sasseram Branch</i>                      |     |     |     | Rs        | Rs          |
|---------------------------------------------|-----|-----|-----|-----------|-------------|
| Brought forward                             |     |     |     | ...       | 104,16,910  |
| Land                                        | ..  | ..  | ..  | 54,452    |             |
| Roads, Fences and Plantations               | ... | ... | ..  | 54,818    |             |
| Excavation                                  | ... | ... | .   | 5,84,166  |             |
| Works of drainage and regulation of supply  |     |     | .   | 4,37,600  |             |
| Falls                                       | ..  | ..  |     | 4,09,000  |             |
| Distributaries                              | ..  | ... | ... | 8,49,700  |             |
| Bridges and Fords                           | ..  | ... |     | 2,66,902  |             |
| Accommodation for Establishment             |     | ... | ... | 1,19,575  |             |
| Locks                                       | ..  | ... | ..  | 7,29,700  |             |
| Mills                                       | ..  | .   | ... | 68,600    |             |
|                                             |     |     |     | <hr/>     |             |
|                                             |     |     |     | 35,73,413 |             |
| Establishment                               |     |     |     | 4,46,677  |             |
|                                             |     |     |     | <hr/>     |             |
|                                             |     |     |     | 40,20,090 |             |
| Add 30 per cent. as before                  |     |     |     | 10,72,024 |             |
|                                             |     |     |     | <hr/>     |             |
|                                             |     |     |     |           | 50,92,114   |
| <i>Patna Branch</i>                         |     |     |     |           |             |
| Land                                        | .   | .   | .   | 41,128    |             |
| Roads, Fences and Plantations               | ... | ... | ... | 41,927    |             |
| Excavation                                  | ..  | ... | ..  | 4,11,704  |             |
| Works for drainage and regulation of supply |     |     | ..  | 33,000    |             |
| Falls                                       | ... |     | ... | 4,33,000  |             |
| Distributaries                              | ... |     |     | 6,97,700  |             |
| Bridges and Fords                           | ... | ... | ... | 3,35,697  |             |
| Accommodation for Establishment             |     |     | .   | 98,000    |             |
| Locks                                       | ... |     | ... | 7,97,800  |             |
| Mills                                       | ..  | ... | ..  | 47,700    |             |
|                                             |     |     |     | <hr/>     |             |
|                                             |     |     |     | 29,39,656 |             |
| Establishment                               |     |     |     | 3,67,310  |             |
|                                             |     |     |     | <hr/>     |             |
|                                             |     |     |     | 33,05,876 |             |
| Add 30 per cent. as before                  |     |     |     | 8,81,263  |             |
|                                             |     |     |     | <hr/>     |             |
|                                             |     |     |     |           | 41,87,139   |
| <i>Tilaree Branch</i>                       |     |     |     |           |             |
| Land                                        | ..  | ... | ... | 25,656    |             |
| Roads, Fences and Plantations               | ... | ... | .   | 29,509    |             |
| Excavation                                  | .   |     | ..  | 2,49,749  |             |
| Works of drainage and regulation of supply  |     |     | ... | 11,38,700 |             |
| Falls                                       | ..  | ... | ... | 1,74,000  |             |
| Distributaries                              | .   | ..  | ... | 3,77,500  |             |
| Bridges and Fords                           | ... | ... | ..  | 1,91,000  |             |
| Accommodation for Establishment             |     |     | .   | 1,79,000  |             |
|                                             |     |     |     | <hr/>     |             |
| Carried over                                |     |     |     | 22,64,800 | 2,41,91,000 |

|                                 |     |                                    |                 |     | Rs.             | Rs.         |
|---------------------------------|-----|------------------------------------|-----------------|-----|-----------------|-------------|
|                                 |     |                                    | Brought forward | ... | 22,64,489       | 2,06,95,036 |
| Locks*                          | ... | ...                                | ...             | ... | 10,000          |             |
| Mills                           | ... | ...                                | ...             | ... | 36,400          |             |
|                                 |     |                                    |                 |     | <hr/> 23,10,889 |             |
|                                 |     | Establishment                      | ...             | ... | 2,88,855        |             |
|                                 |     |                                    |                 |     | <hr/> 25,99,744 |             |
|                                 |     | Add 30 per cent. as before         | ...             | ... | 6,93,268        |             |
|                                 |     |                                    |                 |     | <hr/>           | 32,93,012   |
|                                 |     | <i>Canals for Navigation only.</i> |                 |     |                 |             |
| Land                            | ... | ...                                | ...             | ... | 34,839          |             |
| Roads, Fences and Plantations   | ... | ...                                | ...             | ... | 42,055          |             |
| Excavation                      | —   | ...                                | ...             | ... | 4,95,819        |             |
| Drainage works                  | ... | ...                                | ...             | ... | 6,40,000        |             |
| Bridges                         | ... | ...                                | ...             | ... | 2,64,000        |             |
| Accommodation for Establishment | ... | ...                                | ...             | ... | 65,725          |             |
| Locks                           | ... | ...                                | ...             | ... | 11,72,000       |             |
| Mills                           | ... | ...                                | ...             | ... | 17,600          |             |
|                                 |     |                                    |                 |     | <hr/> 27,32,038 |             |
|                                 |     | Establishment                      | ...             | ... | 3,41,503        |             |
|                                 |     |                                    |                 |     | <hr/> 30,73,541 |             |
|                                 |     | Add 30 per cent. as before         | ...             | ... | 8,19,611        |             |
|                                 |     |                                    |                 |     | <hr/>           | 38,93,152   |
|                                 |     | Grand Total                        | ...             | Rs. | 2,68,81,200     |             |

The following is a more condensed abstract :—

|                                 |     |                            |     |     |                   |             |
|---------------------------------|-----|----------------------------|-----|-----|-------------------|-------------|
| Land                            | ... | ...                        | ... | ... | 2,30,429          |             |
| Roads, Fences and Plantations   | ... | ...                        | ... | ... | 2,31,511          |             |
| Excavation                      | ... | ...                        | ... | ... | 32,69,840         |             |
| Drainage works                  | ... | ...                        | ... | ... | 46,63,671         |             |
| Falls                           | ... | ...                        | ... | ... | 16,09,000         |             |
| Distributaries                  | ... | ...                        | ... | ... | 27,66,700         |             |
| Bridges and Fords               | ... | —                          | ... | ... | 15,83,159         |             |
| Accommodation for Establishment | ... | ...                        | ... | ... | 6,46,175          |             |
| Locks                           | ... | ...                        | ... | ... | 36,34,683         |             |
| Mills                           | ... | ...                        | ... | ... | 2,25,000          |             |
|                                 |     |                            |     |     | <hr/> 1,88,64,009 |             |
|                                 |     | Establishment              | ... | ... | 23,60,992         |             |
|                                 |     |                            |     |     | <hr/> 2,12,25,001 |             |
|                                 |     | Add 30 per cent. as before | ... | ... | 56,56,199         |             |
|                                 |     | Grand Total as before      | ... | ... | <hr/>             | 2,68,81,200 |

\* It may be stated here that the charge for locks is only the excess over what it would cost to provide falls only : which with the small 60 x 10 feet locks is very trifling.

The amount of this estimate will doubtless appear large when compared with those for the Ganges and Baree Doab Canals. But this admits of explanation from four causes.

1st. As already explained there is a large allowance in the estimates for expensive foundations to the works.

2nd. I have added 30 per cent. as an allowance for the probable rise of prices during the execution of the works.

3rd. The Distributary Channels have not been included in former estimates for Canals of irrigation.

4th. The expense of the works for navigation is very great owing to the great slope of the ground ; and double locks have been allowed on the principal navigable lines.

The following analysis of the charges will show how far these last three causes have operated to increase the estimate.

*Works for Irrigation only.*

|                                                      | Rs.         | Rs.         |
|------------------------------------------------------|-------------|-------------|
| Land ... ..                                          | 1,95,590    |             |
| Roads, Fences, and Plantations...                    | 1,69,456    |             |
| Excavation ... ..                                    | 27,74,521   |             |
| Drainage works ... ..                                | 40,23,671   |             |
| Falls ... ..                                         | 16,09,000   |             |
| Bridges and Fords ... ..                             | 13,19,159   |             |
| Accommodation for Establishment                      | 5,80,450    |             |
| Mills ... ..                                         | 2,07,400    |             |
|                                                      | <hr/>       |             |
| Establishment at 12½ per cent.                       | 1,08,99,247 |             |
|                                                      | 13,64,272   |             |
|                                                      | <hr/>       |             |
| Add 30 per cent. as before ..                        | 1,22,63,519 |             |
|                                                      | 32,66,471   |             |
|                                                      | <hr/>       |             |
|                                                      |             | 1,55,29,990 |
| <i>Distributaries only.</i>                          |             |             |
| 2,071 Miles at Rs. 1,300 per mile                    | 26,92,300   |             |
| 193 Miles of canal supplied with Modules, at Rs. 400 | 74,400      |             |
| Add 12½ per cent. for Establishment                  | 3,45,837    |             |
|                                                      | <hr/>       |             |
| Add 30 per cent. as before ..                        | 31,12,537   |             |
|                                                      | 8,30,010    |             |
|                                                      | <hr/>       |             |
|                                                      |             | 39,42,547   |
|                                                      | <hr/>       |             |
| Carried over ..                                      |             | 1,94,72,537 |



|                                |                         |     | Rs.                | Rs.         |
|--------------------------------|-------------------------|-----|--------------------|-------------|
|                                | Brought forward         | ... | ...                | 1,94,72,537 |
|                                | <i>Navigation only.</i> |     |                    |             |
| Lock Channels to Head works    | ...                     | ... | 1,94,124           |             |
| Locks in Irrigating Branches   | ...                     | ... | 22,72,900          |             |
| Navigable Canals—              |                         |     |                    |             |
| Patna line                     | ...                     | ... | 2,55,147           |             |
| Arrah line                     | ...                     | ... | 2,69,076           |             |
| Kurumnassa line                | ...                     | ... | 3,67,572           |             |
| Sasseram line                  | ...                     | ... | 2,54,469           |             |
| Main Benares line              | ...                     | ... | 15,85,774          |             |
|                                |                         |     | <u>27,32,038</u>   |             |
|                                |                         |     | 51,99,062          |             |
| Establishment at 12½ per cent. | ...                     | ... | 6,49,893           |             |
|                                |                         |     | <u>58,48,945</u>   |             |
| Add 30 per cent. as before     | ...                     | ... | 15,59,718          |             |
|                                |                         |     | <u>74,08,663</u>   |             |
| Grand Total as before          | ...                     | Rs. | <u>2,68,81,200</u> |             |

To compare the cost of the Ganges Canal with the above estimate of the cost of Soane Canals, we have the following data :—

|                                                                       |                    |
|-----------------------------------------------------------------------|--------------------|
| In the Revenue Report of 1859-60 the total outlay, exclusive of Dis-  | Rs.                |
| tributaries, is set down at                                           | 1,64,57,000        |
| Add for Futtehgarh Branch                                             | 15,00,000          |
| Add for Bulundshuhur and Koel Branches                                | 6,00,000           |
|                                                                       | <u>1,85,57,000</u> |
| Total outlay to complete the works without Distributaries             | 1,85,57,000        |
| Add for Distributaries say on 800 miles of canal, at Rs. 5,000 per    |                    |
| mile (i. e., giving 5 miles of Distributary at Rs. 1,000 to each mile |                    |
| of canal)                                                             | 40,00,000          |
|                                                                       | <u>2,25,57,000</u> |
| Total cost...                                                         | Rs. 2,25,57,000    |
| Deduct cost of works for navigation—                                  |                    |
| 14 locks at Rs. 20,000                                                | 2,80,000           |
| Upper Navigable Channel                                               | 40,000             |
| 10 lock channels below, at Rs. 8,000                                  | 80,000             |
| Cawnpore Terminal locks                                               | 2,00,000           |
|                                                                       | <u>6,00,000</u>    |
| Cost of the Canal with Distributaries and without navigation          | <u>219,57,000</u>  |

Now the cost of the Soane Canals as estimated by me is excluding the 30 per cent. added —

|                                            | Rs          |
|--------------------------------------------|-------------|
| For the ordinary works, with Establishment | 1,22,63,519 |
| For Distributaries with ditto              | 31,12,537   |
|                                            | <hr/>       |
|                                            | 1,53,76,056 |
| Deduct cost of dam                         | 18,01,205   |
|                                            | <hr/>       |
| Balance                                    | 1,35,71,851 |
|                                            | <hr/>       |

which does not very greatly exceed half of the above estimate for the Ganges Canal, the discharges being 6,750 and 3,124 cubic feet per second respectively, and the rates for the Soane Canals about 10 per cent higher on the average, in addition to the costly foundations allowed, and the double locks on the navigable lines

|                                                                                                                                  | Rs          |
|----------------------------------------------------------------------------------------------------------------------------------|-------------|
| For the Baree Doab Canal we have from the revised Estimate the total cost on a discharge about equal to that of the Soane Canals | 1,35,00,491 |
| Distributaries as estimated by Captain Dyas, at 3 miles of Rajbaha to one of canal                                               | 17,45,000   |
|                                                                                                                                  | <hr/>       |
| Total                                                                                                                            | 1,52,51,491 |
| Deduct works for navigation including share of Establishment, about                                                              | 8,00,000    |
|                                                                                                                                  | <hr/>       |
| Cost of the canal exclusive of works of navigation                                                                               | 1,44,51,491 |
|                                                                                                                                  | <hr/>       |

The Baree Doab Canal rates for masonry are considerably higher than those in my estimate, so that it will be necessary to take the estimates with the 30 per cent added, for comparison

|                                                                     | Rs          |
|---------------------------------------------------------------------|-------------|
| Canals without Distributaries, as above given                       | 1,55,00,000 |
| Distributaries                                                      | 30,42,517   |
|                                                                     | <hr/>       |
|                                                                     | 1,91,57,413 |
| Deduct cost of dam across the Soane with share of Establishment, &c | 22,85,300   |
|                                                                     | <hr/>       |
| Cost of Soane Canals, omitting dam                                  | 1,71,72,117 |
|                                                                     | <hr/>       |

Which, as before, shows the Soane Canal estimate to be higher, owing however entirely to the difference in the estimated cost of the Distributaries

|                                |                         |     | Rs.             | Rs,             |
|--------------------------------|-------------------------|-----|-----------------|-----------------|
|                                | Brought forward         | ... | ...             | 1,94,72,537     |
|                                | <i>Navigation only.</i> |     |                 |                 |
| Lock Channels to Head works    | ...                     | ... | 1,94,124        |                 |
| Locks in Irrigating Branches   | ...                     | ... | 22,72,900       |                 |
| Navigable Canals—              |                         |     |                 |                 |
| Patna line                     | ...                     | ... | 2,55,147        |                 |
| Arrah line                     | ...                     | ... | 2,69,076        |                 |
| Kurumnassa line                | ...                     | ... | 3,67,572        |                 |
| Sasseram line                  | ...                     | ... | 2,54,469        |                 |
| Main Benares line              | ...                     | ... | 15,85,774       |                 |
|                                |                         |     | <hr/> 27,32,038 |                 |
|                                |                         |     |                 | <hr/> 51,99,062 |
| Establishment at 12½ per cent. | ...                     | ... | 6,49,883        |                 |
|                                |                         |     |                 | <hr/> 58,48,945 |
| Add 30 per cent. as before     | ...                     | ... | 15,59,718       |                 |
|                                |                         |     | <hr/>           | 74,08,663       |
|                                |                         |     |                 | <hr/>           |
| Grand Total as before          | ...                     | Rs. | 2,68,81,200     |                 |

To compare the cost of the Ganges Canal with the above estimate of the cost of Soane Canals, we have the following data :—

|                                                                      |             |
|----------------------------------------------------------------------|-------------|
| In the Revenue Report of 1859-60 the total outlay, exclusive of Dis- | Rs.         |
| tributaries, is set down at                                          | 1,64,57,000 |
| Add for Futtelgurh Branch                                            | 15,00,000   |
| And for Bulundshuhur and Koel Branches                               | 6,00,000    |

|                                                                                                                                                    |                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Total outlay to complete the works without Distributaries                                                                                          | 1,85,57,000     |
| Add for Distributaries say on 800 miles of canal, at Rs. 5,000 per mile (i. e., giving 5 miles of Distributary at Rs. 1,000 to each mile of canal) | 40,00,000       |
| Total cost...                                                                                                                                      | Rs. 2,25,57,000 |

Deduct cost of works for navigation—

|                                      |                |
|--------------------------------------|----------------|
| 14 locks at Rs. 20,000               | 2,80,000       |
| Upper Navigable Channel              | 40,000         |
| 10 lock channels below, at Rs. 8,000 | 80,000         |
| Cawnpoor Terminal locks              | 2,00,000       |
|                                      | <hr/> 6,00,000 |

|                                                              |     |            |
|--------------------------------------------------------------|-----|------------|
| Cost of the Canal with Distributaries and without navigation | ... | 219,57,000 |
|--------------------------------------------------------------|-----|------------|

Now the cost of the Soane Canals as estimated by me is, excluding the 30 per cent added —

|                                           | Rs          |
|-------------------------------------------|-------------|
| For the ordinary works with Establishment | 1,22,63 519 |
| For Distributaries with ditto             | 31,12,537   |
|                                           | <hr/>       |
|                                           | 1 53 76 056 |
| Deduct cost of dam                        | 18 04 205   |
|                                           | <hr/>       |
| Balance                                   | 1,35 71 851 |
|                                           | <hr/>       |

which does not very greatly exceed half of the above estimate for the Ganges Canal, the discharges being 6,750 and 3,124 cubic feet per second respectively, and the rates for the Soane Canals about 10 per cent higher on the average, in addition to the costly foundations allowed, and the double locks on the navigable lines

|                                                                                                                                  | Rs          |
|----------------------------------------------------------------------------------------------------------------------------------|-------------|
| For the Barce Doab Canal we have from the revised Estimate the total cost on a discharge about equal to that of the Soane Canals | 1,35 09 491 |
| Distributaries as estimated by Captain Dyas at 3 miles of Rajbaha to one of canal                                                | 17,15 000   |
|                                                                                                                                  | <hr/>       |
| Total                                                                                                                            | 1,52 54,491 |
| Deduct works for navigation including share of Establishment about                                                               | 8 00 000    |
|                                                                                                                                  | <hr/>       |
| Cost of the canal, exclusive of works of navigation                                                                              | 1 44,54 491 |
|                                                                                                                                  | <hr/>       |

The Barce Doab Canal rates for masonry are considerably higher than those in my estimate, so that it will be necessary to take the estimates with the 30 per cent added, for comparison

|                                                                      | Rs          |
|----------------------------------------------------------------------|-------------|
| Canals without Distributaries, as above given                        | 1,53 29,290 |
| Distributaries                                                       | 39 12,517   |
|                                                                      | <hr/>       |
|                                                                      | 1,91 57,413 |
| Deduct cost of dam across the Soane with share of Establishment, &c. | 22,63,376   |
|                                                                      | <hr/>       |
| Cost of Soane Canals omitting dam                                    | 1 71 72,117 |
|                                                                      | <hr/>       |

Which, as before, shows the Soane Canal estimate to be higher, owing however entirely to the difference in the cost of the Distributaries

## SECTION XV.—INCOME, EXPENDITURE, AND PROFITS.

*A.—Income, &c., from Irrigation.*

Before proceeding to fix the rates of charge and probable returns from the irrigation, it will be satisfactory to review the assessment of the Land Revenue of the tract into which the irrigation is to be introduced, and its incidence on the area and population; and to compare South Behar in these matters with the neighbouring districts of the North-Western Provinces.

The following are the Pergunnahs\* of Shahabad (west of the Soane), which will be either entirely, or with very little exception, under the influence of the irrigation :—

| Names.          | Population. | Area.         | Assessment of                   |
|-----------------|-------------|---------------|---------------------------------|
|                 |             | Square miles. | Land Revenue.<br>Rs. per annum. |
| Dunwar ... ..   | 1,21,950    | 336·4         | 64,724                          |
| Dinareh ... ..  | 44,345      | 55·1          | 19,074                          |
| Chowsa ... ..   | 74,965      | 201·2         | 81,824                          |
| Peeroo ... ..   | 1,31,710    | 201·5         | 56,218                          |
| Nonore ... ..   | 1,10,960    | 107·3         | 29,876                          |
| Ponwar ... ..   | 91,345      | 113·3         | 51,409                          |
| Beeheea ... ..  | 1,14,170    | 231·3         | 1,05,246                        |
| Bhojpoor ... .. | 2,29,979    | 423·6         | 1,59,720                        |
| Total ...       | 9,19,424    | 1669·7        | 5,68,091                        |

This gives a population of 556 per square mile, and a Land Revenue of As. 9-10 per head of population, or As. 8-7 per acre of gross area.

The population of the whole district, including the hilly tracts, is 367 per square mile, and the assessment As. 10-8½ on the gross area.

There are unfortunately no similar statistics on record for the Districts of Behar and Patna, east of the Soane. The Report of the

\* The maps printed with this Report do not show the boundaries of the Pergunnahs. They will be found in the 88th, 89th, 103rd and 104th sheets of the India Atlas, published by Mr. J. Walker, Geographer to the Secretary of State for India. The figures above are taken from the Official Return by Mr. Travers, Collector of Shahabad, dated 9th April 1849.

Revenue Surveyor Lieutenant (now Lieutenant Colonel) W. MARTEL gives the population of Patna, according to a census of 1837, at 815,790 souls, including the city, which contained 281,132. The area of the district is 1,835 square miles. The population per mile, excluding the city, is thus 306 souls. For Behar we have only a very imperfect statement, based on the Chowkedaree Tax papers, which makes the population altogether 10,000,000, which on the area of 5,694 square miles gives only 176 souls per square mile, on an area including very large tracts of hills and jungle.

The portion of country irrigated by the Eastern Soane Canal contains some of the best tracts in both districts, and I should suppose is not, *on the average*, less populous than the country to be irrigated in Shahabad, west of the Soane. The upper parts near the trunk road are no doubt less populous, but the population increases in proceeding towards Patna.

If we now take the same particulars of the Pergunnahs of the Districts of Ghazeepeer and Benares on the south of the Gange, we shall find\*

| Names       | Population | Area         | Land Revenue  |
|-------------|------------|--------------|---------------|
|             |            | Square miles | Rs. per annum |
| Fall oopoor | 26 066     | 29.5         | 35 035        |
| Mowaoe      | 9 718      | 17.8         | 20,979        |
| Mal oosree  | 18 375     | 32.7         | 23,642        |
| Burub       | 25 257     | 47.0         | 45 505        |
| Dhoos       | 20 931     | 45.8         | 28 002        |
| Majl war    | 30 535     | 70.9         | 40 975        |
| Bidl wul    | 31 755     | 60.5         | 32,913        |
| Nurwan      | 39 723     | 105.6        | 57 212        |
| Muhalt h    | 46 007     | 8.2          | 61 359        |
| Zumaneeah   | 173 011    | 289.8        | 174 963       |
| Total       | 432 030    | 791.8        | 5 17,313      |

which gives a population of 545 per square mile, with a revenue of Rs. 1-1-11 per head of population, and Rs. 1-0-6 per acre of gross area. The area of actual cultivation is 172,264 acres, or 73.3 per cent of the whole, so that the Land Revenue is Rs. 1-6-6 per acre.

\* From the Report of the census of 1861, in the North W.

It will be seen that the assessment here is double that of Shahabad on the same population.

The three best Pergunnahs of the Benares District, after excluding those in immediate contiguity to the city and on the bank of the Ganges, are :—

| Names.        |     |     |     | Population. | Area in square miles. | Land Revenue.<br>Rs. per annum. |
|---------------|-----|-----|-----|-------------|-----------------------|---------------------------------|
| Uthganwan     | ... | ... | ... | 26,103      | 35.8                  | 48,252                          |
| Kuswar Sirkar | ... | ... | ... | 32,048      | 43.9                  | 50,985                          |
| Pundruha      | ... | ... | ... | 35,818      | 46.7                  | 57,786                          |
| Total         | ... | ... | ... | 93,969      | 126.4                 | 1,57,023                        |

This gives a population of 743 per square mile, with a Land Revenue of Rs. 1-10-9 per head of population, and Rs. 1-15-0 per acre of gross area. The total cultivation is given at 51,211 acres, which gives an assessment of Rs. 3-1-1 per acre of actual cultivation. The cost of irrigation is probably at least as much more.

The total area over which the irrigation from the Soane canals is to extend is (see Tables, pages 14 to 17) 3,355 square miles; which, according to the rates deduced for the Pergunnahs of Shahabad,\* has probably a population of 550 per square mile, or 1,845,250 souls in all, and is assessed at the rate of As. 9-10 per head of population, and As. 8-8 per acre of gross area, making the total assessment of Land Revenue of about Rs. 11,00,000. If the actual area of cultivation is  $\frac{2}{3}$  of the gross area, as in the Benares District, it may also be concluded that the assessment on the area of actual cultivation is As. 13-0 per acre.

If on the completion of the canals the land were considered to be placed on an equality with the best Pergunnahs of Benares (not possessed of canal irrigation), the assessment at Rs. 1-15 per acre of gross area would give a revenue of Rs. 41,60,200 per annum, or an increase of Rs. 30,00,000 above the present rate; that is of course supposing the return for the canal to be looked for in the increase of Land Revenue only instead of in the water rate.

\* Two-thirds of the area to be irrigated is in Shahabad.

Or, if the rate be taken at Rs 1 10 9 per head of the population, the revenue would rise to Rs 30,75,000, being an increase of Rs 19,70,000 on the present revenue. The mean of these two would give an increase of Rs 25,00,000, which may therefore be considered as equivalent to taking the returns for the canal in increased Land Revenue instead of by levying a water rent. It must be remembered that this supposes the assessment to be made equal to that of certain Pergunnahs of Benares, where the cultivators, in addition to the assessment on the land, have themselves to provide the irrigation at a great expense from wells, whereas the irrigation is supposed to be provided from the Soane canals free of all charge, and yet the same assessment only levied.

But we are dealing now with permanently settled districts, and have nothing to do with enhancement of Land Revenue. I have only brought these figures forward to give some idea of the aspect of the revenue derivable from the canals, considered in reference to the total burdens on land and population.

In the 20th paragraph of my Report of 1855, (Appendix page xx) I concluded that a cubic foot of water per second would suffice for the actual irrigation of 512 beegahs (320 acres) of spring crops, and in the 17th paragraph (page xx) that we could supply this water to the cultivator for Rs  $1\frac{1}{4}$  per beegah, giving him thereby twice as much water as he before obtained for the purpose at Rs  $1\frac{1}{2}$  per beegah. In the calculation nothing is allowed for the cost of sinking and repairing wells, and, as an ordinary unbricked well in Shahabad often lasts only one season, this is a considerable item in the charge. I calculated moreover upon no other receipts from the supply of water but to give the same quantity all the year round for no further charge than the Rs  $1\frac{1}{4}$  per beegah, the water would therefore be available to the cultivator in the rainy as well as in the dry season, and would save his rice crop from injury or total loss in case of scanty rains. Since 1855, however, so great a rise of prices has taken place that the rate may fairly be increased by 25 per cent, or to Rs  $1\frac{3}{4}$  per beegah.

Since 1855 the Government has decided that the cost of the Distributary Channels or Rajbuhas which before was borne by



the cultivator should be borne by the Government, and that an addition should be made to the water rate to meet this charge. This addition has been fixed at Rs. 100 per cubic foot per second of discharge of the Canal. It consists of Rs. 21 as interest on the direct outlay, and Rs. 75 for repairs of the channels, with Rs. 4 added to make even money. This charge in fact takes the place of the cost of constructing and repairing wells, and divided over the 512 beegahs comes to about  $\frac{1}{5}$ th of a Rupee, or  $3\frac{1}{2}$  annas per beegah.

The water rate of the Soane Canals thus fixed will therefore come to  $1\frac{9}{16} \times 512 + 100 =$  Rs. 900 per annum for each cubic foot of discharge per second at the canal head; allowance having already been made for wastage (see Report of 1855). This will be in all Rs. 1-12-2 per beegah (Rs. 2-8-10 per acre) of spring crop (wheat or barley); charge being made for the autumn crop (rice, &c.)

The full rate should not be applied at first, but the water supplied at very low rates till the people have learnt its value, when the rate would be gradually raised.

In the revised estimate of the Baree Doab Canal the revenue from irrigation is thus calculated, on 3,073 cubic feet per second of discharge, of which 130 feet is I believe reserved for Navigation\*—

|                        |     |     |     |                            |
|------------------------|-----|-----|-----|----------------------------|
| Water Rent             | ... | ... | ... | Rs. 15,80,500              |
| Increased land revenue | ... | ... | ... | " 9,31,000                 |
|                        |     |     |     | <u>Total Rs. 25,11,500</u> |

which is at the rate of Rs. 853 per annum per cubic foot on 2,943 cubic feet of discharge. Add to this Rs. 100 from the expenses of Distributaries, and the gross income becomes Rs. 953 a year per cubic foot of discharge per second.

For the Ganges Canal, Colonel Baird Smith calculates, on the 6,750 cubic feet of discharge per second, deducting 400 cubic feet reserved for Navigation—

|                          |     |     |     |                            |
|--------------------------|-----|-----|-----|----------------------------|
| Water Rate               | ... | ... | ... | Rs. 13,27,500              |
| Increase of Land Revenue | ... | ... | ... | " 23,90,400                |
|                          |     |     |     | <u>Total Rs. 37,17,900</u> |

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\* Para. 7, Section VI., of original Report by Capt. Dyas.

## APPENDIX A.

### REPORT OF 1853.

*From* LIEUT C H DICKENS, *to the Secretary to the Govt of Bengal*

CALCUTTA, 25th January 1853

SIR,—I HAVE the honour to request you will do me the favour to lay before the Most Noble the Governor the accompanying Note of a project for Canals chiefly for irrigation in certain districts under the Government of Bengal

2 I need not say anything to prove the advantages of irrigation, which it is well known is in many parts of India the only means by which a spring crop can be produced at all, and in the drier of the localities where a spring crop can be raised without irrigation, the introduction of irrigation has been found to increase the produce by 50 per cent. The labour attendant on the common modes of irrigating the crops is, however, a circumstance not so generally considered, but it is a matter of immense importance when it is borne in mind that all the vast quantity of water procured from wells, or from tanks below the surface of the soil for irrigation has to be raised from 10 to 30 or 40 feet in order to be applied to the crops. It must be evident that the expenditure of so much labouring force as is required to raise this water is a great drain upon the productive resources of the country, and the construction of works affording means of reducing this labour, is a most important public benefit. Some definite idea of the effect of such works may be formed from the consideration that the Ganges Canal is calculated in irrigation alone to perform the work of nearly 300,000 men and 1,200,000 bullocks employed throughout the irrigating season, and besides this will afford labouring force in the way of transport of goods by rafts or boats propelled by its current, and in turning machinery by the more rapid flow of its waters at the falls.

3 To explain briefly the nature of the project I submit, I must observe that in Northern India there are two methods practised on the large scale for obtaining the advantages of irrigation for the crops by the natural flow of water, that is avoiding the expense of raising the water by machinery or animal labour. One of these methods is to dam across small valleys, so as to arrest the surface drainage water of the rains, and to cause it to flow out in the proper season upon the fields below the dams, the other method

the cultivator should be borne by the Government, and that an addition should be made to the water rate to meet this charge. This addition has been fixed at Rs. 100 per cubic foot per second of discharge of the Canal. It consists of Rs. 21 as interest on the direct outlay, and Rs. 75 for repairs of the channels, with Rs. 4 added to make even money. This charge in fact takes the place of the cost of constructing and repairing wells, and divided over the 512 beegahs comes to about  $\frac{1}{5}$ th of a Rupee, or  $3\frac{1}{2}$  annas per beegah.

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|                        |     |     |               |
|------------------------|-----|-----|---------------|
| Water Rent             | ... | ... | Rs. 15,80,500 |
| Increased land revenue | ... | ... | " 9,31,000    |
|                        |     |     | <hr/>         |
| Total Rs.              |     |     | 25,11,500     |

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|                          |     |     |               |
|--------------------------|-----|-----|---------------|
| Water Rate               | ... | ... | Rs. 13,27,500 |
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3 To explain briefly the nature of the project I submit, I must observe that in Northern India there are two methods practised on the large scale for obtaining the advantages of irrigation for the crops by the natural flow of water, that is avoiding the expense of raising the water by machinery or animal labour. One of these methods is to dam across small valleys, so as to arrest the surface drainage water of the rains, and to cause it to flow out in the proper season upon the fields below the dams, the other method

is the conveyance of water in canals from rivers in the hills so as to cause it to flow down upon the plains at a higher level than the land to be irrigated. The first mode is applicable to parts of the country having a succession of high and low lands at short intervals,\* and the second to extensive plains lying at the foot of masses of hills in which there are rivers having a considerable supply of water all the year round.

4. In addition to the advantages of irrigating much of the land by the natural flow of water, the two kinds of works alluded to admit of extension of irrigation by the use of labour, and commonly by a smaller expenditure of labour than is required to raise water from wells or from tanks at the ordinary depth below the soil, and in the cases in which they have been constructed, the retaining dams and the canals have afforded a good supply of water where before the supply was scanty, uncertain, or altogether wanting.

5. The plan I propose is a combination of the two abovementioned methods of procuring irrigation by the natural flow of water to suit the case of extensive plains lying at the foot of hills, in which there are no rivers having any considerable supply of water in the dry season. I propose to form reservoirs in the hills to be filled by surface drainage from the rains, and to lead the water of these reservoirs by means of canals over the plain country for use during the dry months.

6. The paper contains such a general discussion and feasibility of the project and of its prospect of being beneficial to the people and profitable to Government as I have been able to draw up from the information I could procure, chiefly Colonel Cautley and Colonel Dixon's works; but I have not thought it advisable to draw plans of canals or reservoirs, or to fix upon their courses, sites, or dimensions, without the precise information only to be procured by a special survey of the locality in which it is proposed to construct the works.

7. My plan does not contemplate any heavy expenditure until after a full local investigation and subsequent experiment on a small scale shall have proved the project to be feasible and beneficial, and then it can be extended gradually as financial convenience and other considerations may render its extension desirable.

8. I beg to add that I have not ventured to submit this paper for the orders of Government without consulting the Engineer Officers residing in Calcutta and others I thought likely to be able to judge of the matter, and that the opinions I have obtained from all are such as to lead me to hope the project may prove worthy of adoption.

I have, &c.,

C. H. DICKENS, *Lieut.*

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\* This includes continuous somewhat steep slopes.

## NOTE ON A PROJECT FOR CANALS IN CERTAIN DISTRICTS OF BENGAL

At a time when the constructions of canals for irrigation and navigation is attracting so much attention in India, it may be acceptable to the Government to bring forward a scheme by which works of the same nature may be constructed in districts within the jurisdiction of Bengal

2 I shall chiefly confine my remarks to the Shahabad District, because it is the best suited to my purpose, and because I am better acquainted with it than with any other district under the Government of Bengal. What is said of Shahabad will, however, be in a great measure applicable to the other districts, to which I shall afterwards briefly refer

3 The district of Shahabad is in shape nearly triangular, its shortest side to the south-west being in mass of hills of considerable elevation, and of the two longer sides, the one to the north north-west is bounded by the Rivers Kurumnassa and Ganges, and the other, to the south-east by the Soane. The rivers which take their rise in the hills to the south-west of this district, like most other hill streams, become very violent torrents in the rainy season, and cut their channels deep below the surface as they descend into the plains. In the dry season consequently when there is but little water left in the channels, that little water is so far from the surface as to be deprived of much of its value for irrigation, because of the great labour that must be expended to raise it to the level of the crops. I have seen no fewer than 14 men in the irrigating season employed at one time and in one spot raising water stage by stage from the channel of the Kurumnassa River to irrigate one small patch of cultivation. And with wells the expenditure of labour is not less, for the water in them is no nearer the surface

4 Now a canal for irrigation, the supply of which is derived from hills, is so contrived as to descend by an easy slope to the plains, so that the water surface shall not, as in rivers, be suddenly carried deep below the surface of the soil, but shall always remain above, or at least not much below it. The consequence

If a properly contrived canal were constructed to pass by the spot when I saw the 14 men employed in raising the water from the Kurumnassa, one or two boys to open and close the irrigation openings would do all the works of irrigation, and the 14 men and others similarly situated would be at liberty to apply their energies to cultivating more land, or could devote themselves to some branch of productive industry.

5. From this it appears that a canal must be wanted wherever the crops require irrigation, and that the urgency of want will depend on the depth below the surface from which the water must be raised to be applied to the crops. The banks of the Kurumnassa are nearly the lowest part of the Shahabad District and the water there is from 25 to 30 feet below the surface of the soil. It is likely therefore that water will in general not be found much nearer the surface in the rest of the district, and I may, think, infer that canals must in general be much needed there.

6. From the direction of the water-courses it appears that in crossing the district any where in a direct line from the Soane to the Ganges, the highest portion of the route would be found near the Soane nearly in a line from Sasseram to Arrah. The district may naturally be expected to have a fall from Sasseram towards Arrah, though it would appear that the difference of level is not great. There may perhaps be difficulty from want of sufficient power in carrying a canal all the way to Arrah; but for the greater part of the district there is evidence of ample slope of the ground towards the Ganges, and 200 miles of canal might very advantageously be laid down, it appears, with no engineering difficulty worth speaking of, if we could only be assured of a sufficient supply of water from the hills.

7. The water for the supply of Jumna and Ganges Canal is afforded by the rivers from which they derive their names. Even in the hills in the south-west of Shahabad we have no streams of sufficient magnitude in the dry season to supply 200 miles of irrigation canal. We must therefore resort to the method of supply by reservoirs. This means is very commonly resorted to in the West of Europe, where rivers cannot be made available, although of course inferior in convenience and efficiency to a river supply. The reservoirs are generally constructed by throwing dams across valleys, particularly mountain valleys, and are contrived to receive water from heavy rain, and all small streams in the neighbourhood which the owners of the land can spare are also directed into the reservoirs, and it is even found worth while in some parts of the land to hire the Sunday discharge of Mill-streams, and to produce water by steam from marshes and fens.

8. Now the difference between the nature of the process by which the supply of the reservoirs of the canals I propose is effected and that by which reservoirs in Europe are filled, arises from two circumstances: first, from the supply for a canal of irrigation in this country being so much greater in proportion than for any canal supplied by reservoirs in Europe; and secondly, from the effect of the periodical rains, which will oblige us to collect and store all over water in one grand operation during the rainy season, and to discharge all in one grand operation in the dry season, so separating two

cesses which in Europe are carried on to some extent simultaneously

9 The result of both these points of difference is, that the body of water to be collected in the reservoirs for the canals I propose must be vastly greater than what is required for European canals, and in this result is contained the whole difficulty of the scheme I bring forward

10 In estimating the required and probably obtainable supply of water, it will be convenient to state the quantities in terms of the depth to which the water would fill a reservoir of a mile square and with perpendicular sides. This will be more brief and clear than speaking of millions of cubic feet. For the Grand Junction Canal in England, the 8 reservoirs contain about 1,600 millions of cubic feet, that is, about 58 feet in depth of this imaginary reservoir of a mile square. This supply is for 90 miles of navigable canal. But for 100 miles of irrigation canal in India, of sufficient magnitude to irrigate the lands for 4 or 5 miles on each side of it, Colonel Cautley estimates the supply of water required at 800 cubic feet per second, which for a dry season of 300 days\* would be 744 feet in depth of the imaginary reservoir, or more than 12 times the quantity required for one of the largest canals in England. I have not been able to find any sufficiently detailed account of the canals of Italy and the South of France, to enable me to state how far their supply is derived from reservoirs, but it appears that reservoirs are extensively resorted to in those countries for irrigation†

11 The supply required for the 200 miles of canal for the Shahabad District would therefore be a quantity of water equal to 1,155 feet in depth of this imaginary reservoir to be stored up annually in the hills, but this is from Colonel Cautley's estimate for the maximum supply of a canal fed by rivers. For a canal fed by reservoirs it would be extravagant to allow all the year round the full supply which is only required during the irrigating season, during that season the full supply might be allowed say for 60 days, and for the rest of the season when the water would only be required for ordinary household wants and for the want of cattle for certain minor crops, and to make up for loss by absorption and evaporation, perhaps one fourth of the maximum supply would suffice. If this can be arranged the whole supply for the season need not be more than 600 feet depth of the reservoir, that is of water actually to be discharged by the canals, and allowing 50 per cent for absorption and evaporation in the reservoirs, the total

\* The dry season is usually 9 months or 270 days. I allow a margin of 30 days.

† [This was a mistake as regards Italy. See Colonel Hardham's Italian Irrigation, since published.—1861.]



3rd. Expense of distributing it over the plains.

19. On the first head I must derive my information from the cost of Colonel Dixon's reservoirs. On the second and third from the Ganges Canal raised estimate of 1850.

The six large tanks Colonel Dixon describes in the greatest detail (not being old works renewed or embanked tanks on low-land) are—

|   | Names.            | Greatest depth of water. | Area in Local Beegahs. | Cost.  |
|---|-------------------|--------------------------|------------------------|--------|
| 1 | Kabra ... ..      | 20                       | 450                    | 6,248  |
| 2 | ... ..            | 28                       | 500                    | 16,550 |
| 3 | Gohann ... ..     | 21                       | 260                    | 4,270  |
| 4 | Burrar ... ..     | 36                       | 220                    | 4,000  |
| 5 | Duradoo ... ..    | 26                       | 1,000                  | 25,995 |
| 6 | Shreenuger ... .. | 25                       | 800*                   | 14,649 |
|   |                   | Total ...                | .....                  | 71,602 |

The two last are in Ajmere local beegahs, 1,936 Sqr. yds.

The rest in Beawar do., 1,761 do.

\* Given, by a misprint, 300 in Colonel Dixon's list.

The mean depth of these tanks is not given by Colonel Dixon; but assuming it to be  $\frac{1}{3}$ rd of greatest depth, and reducing the quantities of water thus calculated to the standard of the imaginary reservoir I have before taken as the standard measure, I find that the quantity of water in all six tanks is equal to 16 $\frac{2}{3}$  feet depth of the reservoir, which gives the rate of storing water Rs. 4,300 nearly for each foot in depth of the said reservoir, sluices and escapes included.

20. Turning now to Colonel Cautley's papers, the Estimate of the Ganges Canal may be roughly stated thus:—

|                                                                                                                                       |               |
|---------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 6,750 cubic feet of water per second conveyed 24 miles from the hills to the plains, at Rs. 35 $\frac{1}{2}$ per foot per mile ... .. | Rs. 55,68,750 |
| 6,750 cubic feet of water per second distributed over the plains, at Rs. 1,275 per foot ... ..                                        | " 86,06,250   |

Total 6,750 cubic feet per second conveyed and distributed, at Rs. 2,100 per foot ... .. Rs. \*14,175,000

21. For the proposed Canals in the Shahabad district the cost calculated after these data will be—

Quantity of water equal to 900 feet depth in a reservoir of 1 mile square collected and stored in the hills, at Rs. 4,300 per million feet ... Rs. 38,70,000

\* Colonel Cautley's detailed Estimate is Rs. 14,619 less than this.

|                                                                                                                |    |           |
|----------------------------------------------------------------------------------------------------------------|----|-----------|
| 1,600 cubic feet per second conveyed at average distance of 10 miles to the plains at Rs 35½ per foot per mile | Rs | 5,68,000  |
| 1,600 ditto distributed over the plains at Rs 1,275 per foot                                                   | "  | 20,10,000 |
|                                                                                                                |    | <hr/>     |
| Total 1,600 cubic feet per second stored, conveyed, and distributed at about Rs 4,000 per cubic foot           | "  | 61,78,000 |
|                                                                                                                |    | <hr/>     |

This makes the cost of the proposed Canals, in proportion to the supply of water, nearly double that of the Ganges Canal

22 I have first given the rough Estimate exactly on the entire data of the cited works without attempting to adapt them to the case in hand, but I conceive that views given of the expense is more unfavourable than it should be, because in the Shahabad District there would be the advantage over Colonel Dixon's works of a better field for selection of favorable sites for dams so as to enable us to make them less costly in proportion to the water retained, and over Colonel Cautley's works there would be the advantages of a very cheap district for building, of a less difficult country to carry the water over to the plains, and of less distance over which to distribute the water, and therefore smaller and less expensive channels and bridges. Besides these matters I have left out of consideration the very important items of the dry season discharge of the rivers. This I cannot pretend to estimate with anything like accuracy, but as I know the Karamnassa down in the plains has a discharge of 30 or 40 feet per second, the whole discharge of all the rivers in the hills may perhaps be reckoned at 100 cubic feet per second.

23 Allowing this we should only require to store up 620 feet depth of the imaginary reservoir, in order to supply the 200 miles of Canal.

The work of those Colonel Dixon describes which most nearly suits the circumstances of the Shahabad Hills is the Burra Tank, which cost only Rs 2,666½ per foot in the depth to which its waters would fill the imaginary reservoir.

The I tawah branch (or fork) of the Ganges Canal is of dimensions to contain the discharge of the whole of the Canals I propose if taken on one line, that is, it affords about 100 miles of irrigation, and it has locks at its termination to descend to the Jumna. The estimate for it is as follows —

|                             |    |           |
|-----------------------------|----|-----------|
| Earth work                  | Rs | 6,03,869  |
| Masonry                     | "  | 7,03,290  |
| Contingencies at 5 per cent | "  | 65,357    |
|                             |    | <hr/>     |
| Total Rs                    |    | 13,72,516 |
|                             |    | <hr/>     |

Reducing the cost of masonry to one-half, as per Shahabad rates,\* this becomes:—

|               |        |     |          |
|---------------|--------|-----|----------|
| Earth-work    | ... .. | Rs. | 6,03,869 |
| Masonry       | ... .. | "   | 3,51,645 |
| Contingencies | ... .. | "   | 47,775   |

---

Total Rs. 10,03,289

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which is about Rs. 660 per cubic foot of discharge per second taking it at 8 cubic feet to the mile before.

The country through which these Canals will have to be carried from the hills to the plains is so much easier than the country the Ganges Canal has to cross that (considering the cheap rate of the district) the cost of that part of work may be taken at one-half of the rate of Colonel Cautley's Estimate.

24. Putting all those considerations together, I give now a lower estimate for the proposed 200 miles of Canals, thus:—

|                                                                                                                                                     |        |     |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----|-----------|
| Water stored equal 620 feet depth of a reservoir<br>of a mile square, at Rs. 2,666 $\frac{2}{3}$ per foot                                           | ... .. | Rs. | 16,53,000 |
| 1,600 cubic feet of water per second carried over<br>an average of 10 miles of hills to the plains at<br>say Rs. 17 $\frac{3}{4}$ per foot per mile | ... .. | "   | 2,84,000  |
| 1,600 ditto distributed over the country, at<br>Rs. 660 per foot                                                                                    | ... .. | "   | 10,56,000 |

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Total Rs. 29,93,000

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which is under Rs. 2,000 per cubic foot of discharge per second, and something below the cost of the Ganges Canal water.

25. The first item of this estimate I believe still to be over-estimated; but it will hardly be safe to make any further reduction until the country has been examined. I will only state that from Captain Sherwill's Geological Map and Sketches thereon it appears that one of the valleys (near the Shurgurah Fort) which receives the drainage of 120 square miles of hill country, has a gorge of only a few hundred feet wide, with high perpendicular sand-stone rocks on each side to dam this. To the height of 100 feet would probably not cost Rs. 1,00,000, and the reservoir formed might certainly be made to contain  $\frac{1}{4}$  of the whole required supply for the 200 miles of Canal, and at this rate 4 lakhs instead of 16 would be the first item of the estimate. This shows how greatly the first item of the estimate may be reduced if the examination of the hills give favourable results.

risen greatly since

written.—1861.

26. Going on now to the question of returns, I give an abstract of the actual returns of the Jumna Canals on an average for the last five years—

| On each cubic foot of the maximum discharge per second.                                               | Western Jumna Canal, maximum discharge 2 000 | Eastern Jumna Canal maximum discharge 600 |
|-------------------------------------------------------------------------------------------------------|----------------------------------------------|-------------------------------------------|
| Gross return from water rent mills, rafting timber, &c., of which the water rent is about 85 per cent | 153 4                                        | 186 0                                     |
| Deduct expense in Establishment and Repairs                                                           | 68 1                                         | 95 4                                      |
| Balance net return                                                                                    | 85 3                                         | 91 5                                      |

which gives a return clear of expenses of a little more than 4 per cent on the Ganges Canal Estimate and lower estimate of the Shahabad Canals, and about  $2\frac{1}{2}$  per cent on the higher estimate.

27. The Jumna Canals, however, have not yet attained a degree of employment equal to the full working power of a well contrived Canal. Colonel Cuttley reckons that each cubic foot of discharge per second should irrigate 350 beegahs or 218 acres, and the water rent being R 1 per acre, this would give a gross return of R 218 per cubic foot of discharge, add R 32 for mills, rafting, &c, total R 250, and from this deduct expenses at R 80, being about the average of the Jumna Canals, and there remains a net return of R 170 on each cubic foot of water discharged per second, which is  $8\frac{1}{2}$  per cent on the lower estimate, and about 4 on the higher.

28. But the direct revenue on Canals is not the main thing looked to in the North-Western Provinces. There the chief return is taken to be indirectly in the revenue arising from the increased cultivation of the country. I believe the nature of the revenue settlement in Bengal will prevent any return from the outlay on Canals in the shape of increased land revenue. But if the cultivator cannot be made to pay a fair price for the advantages of the canal from the rent of the land, it is right that he should pay in the way of rent for the water.

29. The irrigation by wells of 10 acres of land requires, according to Colonel Cuttley's calculation, the employment of two men and eight bullocks, while the same effect where there is a canal can be produced by one-fifth part of the labour of one bullock. The mere cost of the labour employed in well irrigation, therefore 10 acres of land, taking it for two months in the year, cannot be less than R 21 per annum; for the cost of canal irrigation we

have the fifth part of the labour of the boy for the two months not more than R. 1, and the water-rent at R. 1 per acre, Rs. 10; total Rs. 11, or not half the cost of the well irrigation. But besides the difference of actual labour, there is the loss of capital sunk in pukka wells, or the expense of the renewal and repairs of cutcha wells, which are much more costly matters than the constructions and repairs of irrigating channels from the canal.

30. This shows that even in the most unfavourable case, namely, that in which the cultivator has means of irrigating his land, he would gain greatly by the construction of canal, and that he could well afford to pay a much higher rent for the water, if he does not pay increased rent for the land it enables him to improve or bring into cultivation. It appears therefore that the nature of the land settlement in Bengal need be no obstacle to canals being made as profitable an investment of Government Funds in Bengal as in the North-Western Provinces.

31. Again, I find from the printed return that the Shahabad District contains 2,085,561 acres of cultivated and culturable land, and that the revenue assessments is Rs. 13,94,397, that is only 10 annas  $8\frac{1}{2}$  pie per acre. The average of the assessment in the North-Western Provinces is Rs. 1-12-11 per acre of cultivated land; so that on a settlement like that of the North-Western Provinces the revenue of Shahabad might be nearly trebled if all the land could be brought under cultivation. This shows to how great an extent it would be worth the cultivators' while to pay water rent for canals.

32. For the Husli Canal in the Punjab the people now actually pay Rs. 2-6-8 per acre for water rent; and from all accounts of the busy agricultural prosperity which follows the introduction of the means of irrigation, in all parts of India, I feel no doubt but that the people would be most willing to pay Rs. 2 per acre for water rent in the Shahabad district as soon as the advantages of the canal come to be fully understood, considering that the cultivators there can be taxed nothing more for the land the canal would enable them to cultivate or to improve.

33. Doubling the Jumna Canal rate of water rent (that is, making it Rs. 2 per acre) would make the return on the proposed Shahabad Canals, estimated by those of Jumna Canals, about  $10\frac{3}{4}$  or  $12\frac{3}{4}$  per cent. on the outlay as per lower estimate, and on the higher estimate from  $5\frac{3}{8}$  to  $6\frac{3}{8}$  per cent.; or taking the full working rate as per Colonel Cautley's calculation of the irrigating powers of canals, the return would be  $19\frac{1}{2}$  per cent. on the lower, and about 10 per cent. on the higher estimate.

34. I have now stated all I have to say on the prospects of the proposed Shahabad Canals considered merely in view to their chief object, irrigation; and the same advantages may, if the scheme succeed, be obtained on the south bank of the Soane in Behar from the hills in which are the sources of the Fulgoo, Morhur, &c., and also as far as the progress of civilization and

population admits of a prospect of any return in the other Districts all round the same mass of hills, to the valleys of the Damooda and Dalkisore

35 It may not be out of place here to suggest that if the case be considered made out, that the proposed Shahabad Canals have a fair prospect of yielding a good return, a similar or perhaps a better return would, in all probability accrue from the construction of a canal with a river supply obtained from the Gunduck\* in the Sirun and Tirhoot districts. The British dominions extend sufficiently far up the stream of the Gunduck to allow of a good head of supply. The south parts of these districts frequently want water, and the lower part of the Canal would be a great boon to the Tirhoot planters, and proportionally profitable to Government. I speak of course only from general knowledge, and subject to correction after a detailed examination of the river and districts.

36 Next to the irrigation of the crops in ordinary seasons, the canal requires consideration as a means of guarding against the evils of drought. Until the possibility of retaining the water at a reasonable cost for one season is fully made out, it would be premature to reckon on retaining it so long as to secure the country against the danger of famine from the failure of a season's rain. But granting that from a moderate season's rain water could be laid up in the reservoirs so as to suffice for the irrigation of the crops for the succeeding dry season, and that we could afford room in the reservoirs for more water, I think the excess of water in years of more than ordinary plenty might be retained for years of deficient rains. The greater the quantity of water collected, the smaller is the proportion of the wastage by evaporation and absorption to the whole, so that any excess remaining in the reservoirs at the conclusion of any one dry season would not only be an addition to the next season's supply, but would have the effect of diminishing the percentage of the next season's waste, and thus would cause an accumulation from year to year so long as the fall of rain was not much below average. Besides this we have the chance of the not uncommon occurrence of rain falling plentifully in the hills when very little falls in the plains. But it must be confessed that Canals fed by reservoirs to be filled by rain are very inferior to Canals fed by perennial rivers as preservatives against famine.

37 The advantages of navigation would of course be to a great degree obtainable from these Canals, but unless the supply of water proves to be very ample for irrigation, it will not be prudent to attempt to carry the navigation down to the Ganges. Could this be done however the Canals, besides allowing of the cheap transport of fire wood, timber, and building materials, and also iron ore to the

conveying coal  
so possibly from  
established in

\* Perhaps also from the Hoosce to the east of Tirhoot.



## REPORT OF 1855.

*From CAPTAIN C H DICKENS, late on special duty in Shahabad, to  
the Secretary to the Government of Bengal*

*Calcutta, 22nd June 1855*

SIR,—In continuation of my letter dated Tilothoo, 22nd January 1855, I have the honour to state that I closed my survey of the Shahabad district at Sasseram on the 23rd April, and returned to Calcutta on the 30th idem.

2 As it will take some weeks to plot my lines of levels and prepare the drawings necessary for the full elucidation of my investigations, I beg now to furnish a Report of the general results of my survey, in which I shall give as much as possible of the information I have collected, noticing the points on which I cannot speak precisely till the drawings are prepared.

3 I have not attempted to collect detailed information as to the quantities of land under cultivation, and bearing each distinct kind of crop in different parts of the district, or in the whole district. To have made a complete investigation of this kind would require much more time than I had to give to the whole enquiry, and I conceive would have no practical value beyond that of the general information I have to give, which was obtained as follows —

We (myself and two Native Levellers) levelled over above 800 miles of country, besides passing to and fro in order to take up new lines of levelling and for other purposes. As we levelled we measured the depth of all the wells within convenient distances (or at least of a sufficient number when they were numerous), and noted the depth of water in each. We observed generally the state of the crops, we enquired of the people concerning them, and particularly of the labour, cost, and effect of irrigation, and we compared their replies with our own observations. I also obtained information from the Collector's Office at Arrah on the same subjects.

4 Bearing in mind that canals in the North-Western Provinces are considered to be in full work when they afford irrigation to  $\frac{1}{3}$ rd of the actual surface of the country within reach of which the water is brought, I think the following particulars will be found sufficient satisfactorily to establish the good prospects of the project under discussion.

5 Excluding the hills and the jungles bordering thereon, about  $\frac{2}{3}$ ths of the Shahabad district appears to be under cultivation, and perhaps  $\frac{1}{3}$ rd bears spring crops. About  $\frac{1}{3}$ rd of the spring crops are irrigated more or less. The portions not irrigated are the rich *Alluvial* land near the Ganges, of which the Arrah and Buxar Rival forms nearly the south boundary, some parts of the country near the lower part of the Koodra where the water is near the surface, the high ground near the hills, where the depth of the water below



the surface is too great to allow of wells being dug, and certain parts of the district, where the people assert they have not time to do the work, but where I suppose they are too indolent to take the trouble.

6. The people appear to depend most on the rice crop, which is cultivated in favourable seasons, with very little trouble, and they will not bestow upon the spring crops the labour which, with the means of irrigation at command, is necessary to bring them to perfection.

7. The irrigation of the spring crop is for the most part effected by drawing water from wells by means of bullocks and the leather bag called a *moth*. In some places, where the water is near the surface, the weighted lever (*lāt*) is used, but it is a more expensive mode of raising water than by the bullocks and *moth*, except where the depth of the wells is very small.

8. There are in some places reservoirs of water for irrigation formed by throwing dams across the small rivers and across nullahs or hollows on the slopes of the hills. The surplus water is allowed to escape round one flank of the dam. The only large reservoir of this description I saw was across the Kao near Bikramgunj. It has a dam nearly three-quarters of a mile long, and 16 feet high in the centre, and was said to have been constructed under the orders or with the assistance of the Collector. The Kao is stated to be dammed in 13 other places, but on a much smaller scale. There are also tanks supplied from channels dug to the larger hill streams (Soora, Door-gowtee, &c.), so as to be filled when the streams are in flood. All these reservoirs are used principally for the rice cultivation, and are generally exhausted before they can be used for the spring crops, or at least after the first watering.

9. I return now to the irrigation from wells by means of the bullocks and *moth*, as being the method most generally employed for the spring crops, and from which therefore I calculate the value of irrigation in the dry season.

10. The wells are not deep, reaching generally from 18 to 28 feet below the surface: on the average perhaps 22 feet. But the supply of water is in most parts of the district scanty, and little more than a foot remains in the wells while the *moth* is in use.

11. To irrigate the crop the water is run through the fields in channels, whence it is sprinkled over the crop with wooden scoops. This mode of irrigation is very inferior to that practised in other parts of India (and for opium in Shahabad) of allowing the water to submerge the whole field plot by plot.

12. With wells of the average depth the irrigation requires two pairs of bullocks (to work and rest by turns) and two men at the well, besides a woman or boy in the field to form the channels and sprinkle the water. On an average one *moth* will water about  $\frac{2}{3}$ th of a beegah ( $\frac{2}{3}$ th of an acre\*) in a day. A

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\* The beegah of 3,025 square yards is used in Shahabad.

labourer who has received an advance of money from his employer gets  $2\frac{1}{2}$  or 3 seers (5 or 6 lbs) of one of the cheapest kinds of grain as his daily wages, value about 3 pice of 20 or 21 *gundis* (or fours) to the Rupee, (that is 80 to 84 to the Rupee, 10 to 12 pice to a shilling). A labourer not in debt is allowed 1 seers of grain, value about  $\frac{1}{4}$  of the pice current in the district, or  $\frac{3}{4}$ ths of an anna of the Company's coinage ( $1\frac{1}{4}$  penny) as his day's wages. I was not able to form a satisfactory direct estimate of the cost of keeping up the bullocks and their gear with the *moth*, but I found the established rate of hire for the two pairs of bullocks with gear and *moth* is 1 anna (6 pence) a day. The cost to the proprietor would, I suppose, be something less. I therefore set down the cost of one day's irrigation from wells

|                                                                               | RS       | A | P | £ | s | d              |
|-------------------------------------------------------------------------------|----------|---|---|---|---|----------------|
| 2 men                                                                         | 0        | 1 | 6 | 0 | 0 | $2\frac{1}{2}$ |
| 1 woman or boy, omitted, being also<br>required for canal irrigation,         | 0        | 0 | 0 | 0 | 0 | 0              |
| Bullocks and <i>moth</i>                                                      | 0        | 3 | 6 | 0 | 0 | $5\frac{1}{2}$ |
| <hr/>                                                                         |          |   |   |   |   |                |
| One day, or to water $\frac{3}{4}$ ths of a beegah,<br>$\frac{3}{4}$ ths acre | 0        | 5 | 0 | 0 | 0 | $7\frac{1}{2}$ |
| <hr/>                                                                         |          |   |   |   |   |                |
| To water a beegah once, therefore, costs                                      | Rs 0 8 4 |   |   |   |   |                |
| And acre                                                                      | £ 0 1 8  |   |   |   |   |                |

13 The greater part of the spring crop is watered only once or twice in the season, but some of it three times, particularly wheat. Wheat in some few places is watered four times. Where the irrigation was industriously applied, I generally found the rule to be to water barley twice and wheat three times. The excuse for not irrigating more in places where the above was not acted up to was more frequently want of *time* than want of *water*. I am inclined to think the real cause is often indolence rather than scarcity of labour. But for either case the supply of canal irrigation is very small, and the labourers and trouble

the Ganges and a few other wheat and barley are very much to 6 maunds of grain, and those irrigated once or twice yield only from 4 to 5 maunds (12 to 1,024 lbs per acre). Irrigated three times the crop is said to yield from 7 to 10 maunds (576 to 1,250 lbs per acre), but the people told me if they could irrigate 4 times, using abundance of water, they would get from 10 to 15 maunds of grain per beegah (1,250 to 1,920 lbs per acre).

15 Colonel Cauley states the produce in the Saharunpoor and Bahar Districts to be about  $8\frac{1}{2}$  maunds per beegah for unirrigated, and 13 maunds for irrigated land (1,088 and 1,702 lbs per acre). There is certainly a very much greater difference than

this in most parts of Shahabad; and allowing for some exaggeration in the native account above given, I think the supply and use of abundance of water to irrigate the crops would double the produce of the greater part of the district.

16. Watering 3 times in the imperfect way above described, cost as above shown about Rs. 1-9-0 per beegah (5 shillings an acre) for the season,\* and it is evident that the money is well laid out. Doubling the rate of water rent levied in the North-Western Provinces (that is charging Rs. 1-4-0 instead of Rs. 0-10-0 per beegah), 4 shillings instead of 2 per acre, we should be able to supply the cultivators with irrigation 25 per cent. cheaper than they get it now, and in addition give them all the advantages of 4 thorough drenchings for their crops instead of 3 sprinklings. They will besides have the canal supply of water all the rest of the year without any further payment, and will be able to turn it to more profitable account in raising more valuable crops than the wheat and barley, which alone I have calculated upon.

17. I found the water bags used in Shahabad hold on an average about  $2\frac{3}{4}$  cubic feet of water. They were worked for short periods at the rate of about 25 per hour, but that was not kept up throughout the day, and the total number raised daily was said not to exceed 150. To be sure of making a liberal calculation I shall, however, take it at 300. This therefore I take as the bulk of water required for  $\frac{2}{3}$ ths of a beegah ( $\frac{2}{3}$ ths of an acre) for one watering. For a whole beegah this gives 500 bags (800 per acre) for one watering, and 2,000 (3,200 per acre) for four waterings, or a full season's irrigation. But this is for the imperfect kind of irrigation practised in Shahabad. To irrigate thoroughly I shall suppose double the quantity of water necessary, that is 4,000 bags or 11,000 cubic feet per beegah (17,600 cubic feet per acre).

18. The irrigating season in Shahabad commences about the beginning of November and terminates at the end of February. It lasts, therefore, about 120 days. Now one cubic foot of water per second for 120 days is 10,368,000 cubic feet, which will water 942 beegahs or 588 acres. But this is the supply to be delivered from the canal, and it is necessary to add to it the quantity required to make up for the wastage in passing down the channel, in order to determine the discharge required at the canal head.

19. There are no data for ascertaining the loss from evaporation, soakage, leaks, and thefts of water on our Indian Canals. I

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\* Lieut. Col. Baird Smith (page 381, Vol. I., Italian Irrigation) makes it (omitting interest of capital) £1-11-2 $\frac{3}{4}$ . He has, however, calculated the hire of the men and beasts for the whole year, while my calculation extends only to the period of irrigating the spring crops. Taking the irrigating season at 4 months or  $\frac{1}{3}$ rd of the year, the rate comes to £0-10-4 $\frac{1}{2}$ . The difference between this and my estimate may be owing to the greater depth of wells and the more liberal scale of irrigation. But the wages and cost of bullocks differ greatly from those in Shahabad.

[See also the Extracts given at the end of this Appendix. - 1861.]

am obliged therefore to refer to the examples of Italian Canals given in Captain (now Lieutenant Colonel) Baird Smith's work on Italian Irrigation. They are as follows —

| Page of Volume I | Name of Canal   | Total discharge cubic feet per second. | Loss in cubic feet per second. | Percentage of total discharge. |
|------------------|-----------------|----------------------------------------|--------------------------------|--------------------------------|
| 116              | Caluso          | 440                                    | 90.65                          | 20.6                           |
| 224              | Naviglio Grande | 1,851                                  | 158.25                         | 8.6                            |
| 254              | Muzza           | 2,652                                  | 477                            | 18.0                           |
| 270              | Martina         | 813                                    | 105                            | 12.1                           |
|                  | On the whole    | 5,756                                  | 830.9                          | 14.3                           |

From this I infer that even in the dry climate of Shahabad we ought by 20 per cent foot per second irrigation for a square mile

20 In practice in the North Western Provinces I found that each cubic average more than 350 a square mile. Even in the North-Western Provinces, it still appears that the canal water in the North-Western Provinces is very wastefully applied by the cultivators. With the view of inducing economy in the use of the canal water contracts for letting the discharge from established openings were entered into on the Western Jumna Canal when under the superintendence of Lieutenant Colonel Baker, so as to levy the water rent on the quantity of water supplied instead of on the area of land irrigated. But to carry out this principle in full it is necessary to have some uniform and accurate system of measuring the discharge of water from each outlet. This matter has for some time engaged the attention of Lieutenant Colonel Smith, who is about to establish *Mofules* according to the Italian system on the Ganges Canal, and levy water rent in proportion to the discharge measured by means of these contrivances.

21 Anticipating the success of this plan, I may I think calculate that each cubic foot of water supplied per second will

irrigate 512 beegahs (320 acres) or  $\frac{1}{2}$  a square mile,\* and following the Ganges Canal Committee, I shall suppose one-third of the gross area of the flat portion of the district, excluding the Ganges Khadir land, will need to be supplied with irrigation, or that 2 cubic feet per second must be supplied for every three square miles of the gross area.

The sources of supply are—

(1). Reservoirs to be formed in the valleys where the hill streams issue into the plains.

(2). The Soane.

22. In regard to the first source of supply, I have to state that as far as I could ascertain (there being no regular register) the rain fall in the hill tract of Shahabad does not exceed 36 inches per annum on an average. Judging from the data given for supply reservoirs for towns in England, I suppose we may calculate on being able to collect  $\frac{2}{3}$  of the rain fall, that is to say,— $2 \times (5280)^2 = 2 \times 27,878,400 = 55,756,800$ ,—55 millions of cubic feet per square mile of gathering ground.

23. A supply of one cubic foot of water per second for the whole year is equal to 31,536,600 cubic feet, and this is sufficient for  $1\frac{1}{4}$  square miles. Adding 50 per cent. for soakage and evaporation in the reservoir, the quantity to be collected for the purpose is equal to 47 millions of cubic feet, or for each square mile of the gross area of the district to be irrigated  $31\frac{1}{4}$  millions of cubic feet.

24. The rivers from which the reservoirs are to be filled are subject to very violent floods, which do great injury to the crops, but their more moderate floods are highly beneficial, and are made the source of supply of tanks for the rice cultivation by throwing dams across the rivers themselves, or across channels lead from them into natural or excavated hollows.

25. I think it will therefore be right not to attempt to detain the full quantity of water drained from the hills, but using the reservoirs as regulators to let portions of it escape into the rivers from time to time during the rainy season, as it may be required for the rice crops.

26. I have taken therefore the land to be irrigated from the reservoirs as about equal to the gathering grounds. This allows in each square mile of drainage—

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\* Since writing the above I have seen Lieutenant Colonel Smith's calculation appended to his draft of new rules for the distribution of water. For spring crops he allows 4 waterings of 3 inches each, or in all one foot spread over the surface, which gives 43,560 cubic feet per acre in 130 days, whence, making no deduction for loss in the canal, a cubic foot per second is considered adequate to water 360 acres of spring crops for the season.

|                                           | Cubic feet. |
|-------------------------------------------|-------------|
| To be stored for the supply of the Canals | 31,500,000  |
| To be let off for the rice cultivation    | 24,250,800  |
|                                           | <hr/>       |
| Total                                     | 55,750,800  |
|                                           | <hr/>       |

27 This I believe the cultivators will receive the full benefit of their own tanks in addition to the canal supply all the year round. But if there be any deficiency, the latter may be reduced during the season when water is least required.

28 I have calculated the quantity of water required for the whole supply of water for use in case of dearth. I have therefore added extra reservoir room to the extent of 27 per cent, making the whole storage room 10 million cubic feet per square mile of land to be irrigated.

29 From this should be realized water rent at Rs 14 per beegah for  $\frac{1}{3}$ rd of the area to be irrigated (or  $12\frac{2}{3} = 31\frac{1}{3}$  beegahs, being Rs 120  $\frac{2}{3}$  per annum (or four shillings per acre on 213  $\frac{1}{3}$  acres, £12 13 1). Setting aside half of this for establishment, current expenses, and ordinary repairs, the other moiety will at 5 per cent represent a capital of Rs 1,260-10 8 (£126 13-1) to be laid out on storing water for each square mile, according to which calculation the maximum remunerative rate is Rs 106-10 8 (£10 13 4) per million cubic feet. In the Madras Presidency the ordinary rate appears to be Rs 10 (£1) per million cubic feet. Colonel Dixon's rates in Mhairwarrah amount to Rs 150 for the principal tanks but they have masonry dams, while in Madras the dams are generally of earth. From such rough calculation as I have been able to make without complete sections, I believe we shall be able in favourable sites in Shahabad to store water for Rs 25 or 30 the million cubic feet, but for an extensive system all the sites, both favourable and unfavourable, must be occupied, and I do not think the average rate can reasonably be expected to be under Rs 50. I set it down at Rs 60 for the present.

30 The levelling in the ravines and jungles near Sherghur occupied so much time that I was unable to make as complete an examination of the sites for reservoirs as I wished. I believe, however, I shall be able to give tolerably accurate estimates of the cost of storing water at the Toothi Kooni (west of Tilothoo), the Dhora Kooni (south of Sasseram), and the Dargowtee Valley at Sherghur. I also took sections of the gorges from which the Sasseram and Kora Nullies issue, and satisfied myself, by taking a few vertical angles with the theodolite, that the lower parts of the valleys •

have a very gradual rise, and are well suited for the formation of reservoirs. I was unable to visit the Valley of the Kurumnassa or those of its tributaries from the west.

31. The most important of the sites for reservoirs or systems of reservoirs is the many-branched Valley of the Doorgowtee above Sherghur, which carries the drainage of 275 square miles of country through a gorge not a mile wide between the Sherghur Fort and Raja Deo's Peak. The plains slope up to the mouth of this valley, where they attain a height of 370 feet above the level of the sea, and form as it were a *bar* of stiff clay across the gorge through which the Doorgowtee cuts a channel of 85 feet deep. The interior of the valley close to Sherghur is only 325 feet above the level of the sea, and it does not attain the height of 370 feet for six miles further up, so that it is only necessary to dam the river channel and stop some nullahs to pond the water up for the distance of six miles. The valley, however, is narrow, never exceeding half a mile wide, and in places contracting to one-fourth of a mile. It is surrounded by sand-stone hills from 5 to 800 feet high, consisting of a steep slope for one-third of their heights, surmounted by a precipice, above which is the table-land. A reservoir formed here would have a capacity of about 1,000 million cubic feet. Another very good site for a reservoir is in the Kudhur Khoh, where a dam of 70 feet high in the centre, and about 700 feet long in all, will retain about 700 million cubic feet of water. But the joint capacity of these two reservoirs is not one-sixth part of what is required fully to make use of the drainage of the Doorgowtee. To make full use of this drainage, it will be necessary to occupy every branch of the valley, as well as the excellent sites afforded by the great mass of deep ravines which exist around the Doorgowtee for the first 10 miles of its course through the plains, where its channel is from 80 to 40 feet deep.

32. The Dhooa Koond is a deep valley, a mile and a half long, by three furlongs wide at its mouth, situated about four miles south of Sasseram. At its upper extremity is a water-fall (of about 150 feet), by which a stream having a drainage area of about 24 square miles descends from the table-land. Opposite the mouth of the valley is a small detached mass of hills, and the river divides into two, one part passing to the left goes through Sasseram, and under the name of the *Koodra* joins the Doorgowtee a little above the junction of the latter with the Kurumnassa, while the other passing to the right becomes the *Kāō* and proceeds to join the Ganges near Bhojpoor. The adjustment of the levels of these two branches of the stream from the Dhooa Koond is maintained by the Koodra branch passing through a rocky pass and the *Kāō* over a very stiff bed of clay. Both are within two miles of the water-fall.\* The clay appears, however, to be wearing away slowly, and the flow of the Koodra, which car-

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\* The stream has only 4 feet of slope from the foot of the boulders below the water-fall to these obstructions.





of the district have a prejudice against the use of the Soane water

"They (the floods) are always supposed to do injury, and in fact often overwhelm the crops of rice. This seems to have led to an opinion that the water of the Soane River is highly destructive to vegetation, which is very generally asserted and believed throughout the district. This quality of the Soane water was so often and universally insisted upon that I began to be staggered, when on the upper part of the river's course I discovered some industrious persons watering their lands (from the Soane) with the utmost success, though the soil is very poor. Martin's Eastern India, Vol. I., pp. 396—7."

for irrigation, in support of which they refer to the petrifying properties of the water; and it is asserted that since the last severe floods, it has been found impossible to raise sugar-cane near Arrah. But this prejudice appears to have no solid foundation, and as far as my observations go, is most accurately disposed of by Dr. Buchanan (about A. D. 1811) in the passage of his Report on the District of Shahabad, extracted in the margin; and to his remarks

I may add that the formations of mud which occasionally take place amongst the sands of the Soane are almost always cultivated when the waters recede after the rainy season.

42. For the distribution of these various sources of supply of water, according to their several capabilities, the general level of the district appear most favourable. The result of my levelling operations cannot be accurately shown till the complete drawings have been made; but to give a general idea of the slope of the country, I have sketched contour lines on the accompanying map, by tracing on the Revenue Survey Map the villages noted in my Field-books. These lines are sufficiently accurate indications of the level of the country to show the facility of affording irrigation, and particularly from the Soane Canal at Dehree, which will be the chief source of supply.

43. The distribution of the sources of supply is shown on the map by the shades below noted, and the number of square miles to be irrigated from each is as follows:—

| Rivers and Reservoirs.                   |     |     |     |     | Colour on the Map. | No. of square miles. |
|------------------------------------------|-----|-----|-----|-----|--------------------|----------------------|
| Kurumnassa                               | ... | ... | ... | ... | Yellow             | 15                   |
| Kora and Soora                           | ... | ... | ... | ... | Green              | 81                   |
| Doorgowtee                               | ... | ... | ... | ... | Pink               | 8                    |
| Dhooa Koond and Reservoirs near Sasseram | ... | ... | ... | ... | Blue               | 12                   |
| Soane                                    | ... | ... | ... | ... | White              | 25                   |
| Total                                    | ... | ... | ... | ... | .....              | 141                  |

The rough calculation of the areas of drainage and irrigation is shown on a separate sketch map. The drainage of the Kurainassa is omitted, as the Shahabad district will draw little upon it compared with Mirzapoor and Benares.

44 I have now to notice the use which may be made of the contemplated canals as navigable channels, and particularly with reference to the valuable products of the hills to the south of the Shahabad district, on both banks of the upper part of the Soane.

45 *Fuel* from the jungle wood in the hills is an article for which a cheap means of transit to the large cities of Benares, Ghazeeoor, Arrah, &c., is most desirable, and which will no doubt be carried largely on the canals.

46 *Building stone* may also be reckoned as an article for which the navigation will be much used, the quality of the stone in the Shahabad Hills being quite as good if not better than the Chunar stone.

2nd As a paving marble

3rd As metal for roads where Lunkur is scarce, or in supercession of Lunkur

48 *Iron* has been largely worked in former days in the Shahabad Hills, as is evident from the great quantities of slag to be found at the gorges of the valleys. There are no works now (except at Soorkee, which I did not visit), and the natives attribute the slag to the remains of the workshops of the giants (*sur*). I found a good deal of scattered iron ore, and in one or two places observed it piercing the sand stone in veins, and though I had not time to make any such systematic examination as to enable me to say whether there is any prospect of success for iron works on the large scale on the English plan, I am satisfied that small smelting furnaces, such as are used on the Continent of Europe, might be worked to advantage in Shahabad. On the right bank of the Soane there is a large quantity of excellent iron ore, of which I received many specimens when at Benares some years ago.

49 *Coal*—The coal of the Palamow and Singrowlee Hills is the nearest to the North-Western Provinces of any yet discovered in India. It has hitherto been very moderately brought into use, owing to the heavy land carriage and the difficult navigation of the Soane. This coal would no doubt furnish large employment to any safe and direct means of water carriage, particularly now that there is a prospect of the immediate construction of the Railway in the North-Western Provinces.

50 The above will be sufficient to show that the canal from the Soane will be very useful for navigation as well as irrigation. But I am persuaded it will also be worth while to construct a canal chiefly for navigation to carry the coal and other products of the

6.—*Navigable Canal from Sasseram to Benares*—Of which I cannot at present give a rough Estimate.

53. In calculating the value of the land I have been guided by the Valuation Statement of land occupied for the Grand Trunk Road in Shahabad, which I procured from the Office of the Board of Revenue. I extract the following rates, which, however, appear to be extremely low:—

| Kinds of Land. | Estimated gross value of annual produce or capability. | Ditto less half for Government Land Tax. | Deduct 10 per cent. as village expenses. | Balance net annual return. | Price at 20 years' purchase. |
|----------------|--------------------------------------------------------|------------------------------------------|------------------------------------------|----------------------------|------------------------------|
|----------------|--------------------------------------------------------|------------------------------------------|------------------------------------------|----------------------------|------------------------------|

## PER BEEGAH IN INDIAN CURRENCY.

|                           | Rs. A. P. |        |         |          | Rs. A. P. |
|---------------------------|-----------|--------|---------|----------|-----------|
| Cultivated, 1st sort ...  | 1 8 0     | 0 12 0 | 0 1 2 4 | 0 10 9 6 | 13 8 0    |
| “ 2nd “ ...               | 1 0 0     | 0 8 0  | 0 0 9 6 | 0 7 2 4  | 8 15 0    |
| “ 3rd “ ...               | 0 12 0    | 0 6 0  | 0 0 7 2 | 0 5 4 8  | 6 12 0    |
| Fallow, recent, 1st sort. | 0 8 0     | 0 4 0  | 0 0 4 8 | 0 3 7 2  | 4 8 0     |
| “ “ 2nd “                 | 0 6 0     | 0 3 0  | 0 0 3 6 | 0 2 8 4  | 3 6 0     |
| “ old 1st sort ...        | 0 4 0     | 0 2 0  | 0 0 2 4 | 0 1 9 6  | 2 4 0     |
| “ “ 2nd “ ...             | 0 3 0     | 0 1 6  | 0 0 1 8 | 0 1 4 2  | 1 11 0    |
| Jungle nullahs, pits, &c. | 0 2 0     | 0 1 0  | 0 0 1 2 | 0 0 10 8 | 1 2 0     |

## PER ACRE IN ENGLISH CURRENCY.

|                           | £ s. d. |         |         |         | £ s. d. |
|---------------------------|---------|---------|---------|---------|---------|
| Cultivated, superior ...  | 0 4 9 ½ | 0 2 4 ¾ | 0 0 2 9 | 0 2 1 9 | 2 3 2 ½ |
| “ ordinary ...            | 0 3 2 2 | 0 1 8 1 | 0 0 1 9 | 0 1 6 2 | 1 8 7 ¼ |
| “ inferior ...            | 0 2 4 8 | 0 1 2 4 | 0 0 1 4 | 0 1 1   | 1 1 8   |
| Fallow, recent, ordinary. | 0 1 7 1 | 0 0 9 5 | 0 0 0 9 | 0 0 8 6 | 0 14 4  |
| “ “ inferior...           | 0 1 2 4 | 0 0 7 2 | 0 0 0 7 | 0 3 6 5 | 0 10 10 |
| “ old, ordinary ...       | 0 0 9 6 | 0 0 4 8 | 0 0 0 5 | 0 0 4 3 | 0 7 0   |
| “ “ inferior ...          | 0 0 7 2 | 0 0 3 6 | 0 0 0 3 | 0 0 3 3 | 0 5 6   |
| Jungle nullahs, pits ...  | 0 0 4 8 | 0 0 2 4 | 0 0 0 2 | 0 0 2 2 | 0 3 7   |

On the whole 1,105-4-15 Beegahs=690-3-31 acres, which included some Maafee or untaxed land.

|                                                    |           |            |          |           |                 |
|----------------------------------------------------|-----------|------------|----------|-----------|-----------------|
| Indian Currency ... Rs.                            | 401 8 3 ¼ | 204 13 0 ½ | 20 7 9   | 184 5 3 ¼ | 3,686 9 10      |
| English Currency ... £                             | 40 3 1    | 20 9 7 ½   | 2 0 11 ¾ | 18 8 8    | 368 13 2 ¾      |
| Average rate { Per Beegah ... Rs.<br>Acre... ... £ |           |            |          |           | 3 5 4<br>0 10 8 |

The value of the land through which the canals will pass in the plains of Shahabad I estimate, according to the foregoing scale, to be about Rs. 6 per beegah (or £0-19-2 ½ per acre). The value of the hill country to be occupied for reservoirs will not exceed Rs. 1-8-0 per beegah (£0-4-9 ½ per acre).

For the Soane Canal will be required as follows —

22 miles main channel 300 feet, width of land  $\frac{22 \times 1760 \times 100}{30 \times 5}$   
 = 1,280 beegahs

6 Branches of 10 miles each 150 feet, width of land  $\frac{6 \times 49 \times 1760 \times 50}{30 \times 5}$   
 = 6,082 beegahs

In all 8,262 beegahs at Rs 6 = Rs 49,572

Or 5,161 acres £0-10-2½, £1,057.

For the Doorgowtee Reservoirs I suppose the area of land to be occupied will not exceed 20 square miles, almost all now jungle that is, the price will be—

20,150 beegahs at Rs 1-8 Rs 30,720

or 12,500 acres, at £ 0-1-9½ £ 3,072

The others I calculate in proportion, that is, about 5 per cent on the reservoirs, and 1½ per cent on the canals and channels

54 In estimating the returns from these works, I shall compare them with the anticipated return on the Great Ganges Canal according to Lieutenant Colonel Smith's last calculation. The revenue from sources exclusive of water rent has been assumed by Lieutenant Colonel Smith at ⅓ of the latter, but as my rate of water rent is higher, I shall assume ⅔ of it for the probable returns from other sources on the Shahabad Canals

|                                                    | Ganges Canal | Soane Canal | Reservoir Irrigation |
|----------------------------------------------------|--------------|-------------|----------------------|
|                                                    | Rs.          | Rs.         | 1 s.                 |
| Cost per square mile of country to be irrigated.   | 2 115*       | 1 511       | 4 000                |
| Gross returns on water rent } Per square mile      | 197†         | 427         | 427                  |
| If working in full                                 | 37           | 13          | 43                   |
| Ditto on other items                               |              |             |                      |
| Total gross returns work at full rate              | 230          | 70          | 70                   |
| Being per cent on outlay                           | 9½           | 30          | 11½                  |
| Deduct charges assumed as Col. Smith does          | 2½           | 2½          | 2½                   |
| Net return per cent in full work                   | 7            | 29          | 9½                   |
| Working ⅓ of full rate, the gross return is        | 6½           | 20          | 8                    |
| Deduct charges                                     | 2½           | 2½          | 2½                   |
| Net return when working at ⅓ of full rate per cent | 4            | 17½         | 5½                   |

\* Total 163,000,000 = 67,500 cubic feet per second of water irrigating 211 acres each, and still at least over three times this area 1 square mile nearly,  $\frac{163,000,000}{67,500} = 2,415$

†  $\frac{117,500}{67,500} = 1.7$  nearly

The average cost of the whole irrigation of Shahabad, will thus be about Rs. 2,200 (£220) per square mile, yielding about 19 per cent. net return when in full work, and  $11\frac{3}{4}$  per cent. when working at  $\frac{2}{3}$  of the full rate. We may, therefore, be able to afford some reduction of the water rent above proposed. But this is a matter for future discussion.

55. The total cost of the irrigation works for Shahabad on the foregoing rough estimates will be about 61 lakhs of Rupees (£610,000). The total annual payments to be required of the cultivators will be  $12\frac{4}{5}$  lakhs (£128,000) when the irrigation is in full use, and  $9\frac{1}{5}$  lakhs (£91,500) when working at  $\frac{2}{3}$  of the full rate. The total of the Land Tax of Shahabad is Rs. 13,94,396 (£139,440), as stated in the printed Statistical Return.

The irrigation in full work will cover 960,000 beegahs (600,000 acres) of land, and will, I suppose, on the average increase the produce of wheat and barley at least  $2\frac{1}{2}$  maunds per beegah, or 320 lbs. ( $\frac{1}{4}$ th of a ton) per acre. The price of the produce in Shahabad is about 50 seers (100 lbs.) of wheat, and 70 seers (140 lbs.) of barley for the Rupee (2 shillings). Supposing the quantities equal, the average price will be 60 seers for the Rupee, or £1-16-0 per ton, whence Rs. 1-10-8 is the value of the increased produce per beegah; and £0-5-2 $\frac{1}{2}$  per acre. This may, I think, safely be taken as the increased value of the spring crops consequent on the introduction of canal irrigation, and for the whole 960,000 beegahs (600,000 acres) it makes the increase Rs. 15,42,858 (£154,286), so that the increase of grain in the spring crop alone on  $\frac{1}{3}$ rd the area of the district will pay the water rent, leaving the saving in labour on the spring crop and the use of the canal for the remainder of the year clear gain to the cultivators.

56. Having given such a detail of these works as I am at present able to present, I beg to submit for the consideration of the Lieutenant Governor the method I would suggest as the most advantageous for carrying them out. I think it very undesirable that the whole should be put in hand at once, even if it were possible.

1st. Because there would be great difficulty in getting Engineers and Subordinate Establishment.

2nd. Because if got together they would all want the local experience which is so advantageous in carrying on work cheaply and efficiently.

3rd. Because I think it highly desirable to unite the execution of these works with the development of the resources of the district, in workmen, in iron, coal, &c., which we must in a great measure procure from extraneous sources, if the work be carried on rapidly; whereas if we begin by establishing workshops on the small scale, smelting our own iron, and teaching our own Mechanics and Sub-Engineers, we shall soon raise an indigenous staff, be inde-

pendent of foreign support, and we shall set agoing various trades and manufactures in the District.

4th Because the agricultural habits and prejudices of the Natives must be overcome, which will be best done by the gradual introduction of the new modes of irrigation, otherwise our finished works may stand useless in part and unprofitable, while the people are learning slowly the benefit to be derived from them.

5th Because small works will be sooner completed than large, and therefore portion of the benefits to be derived from extended irrigation, and the returns on the expense, will be more quickly realized.

57. I have stated (para 8) that the River Koo is dammed across in 14 places, which dams retain water for the rice, but not for the spring crops. I would begin the irrigation works by carrying a small canal from the Soane at Bandoo to the Koo near where it crosses the Grand Trunk Road. This canal should be so constructed that it may be afterwards enlarged to form the main trunk of the Soane Canal, but at first it should only be used to fill the Koo Reservoirs, and perhaps to afford a few irrigation channels above its junction with the Koo. The dam at Bandoo I would make a very temporary structure of piles, earth, and mats, and I would cross both the Hoosence and Tootha on temporary earthen aqueducts.

I could be glad to pay a moderate sum for the privilege of using the land, and beg permission to address the Collee.

58 This temporary canal and one reservoir at the Dhoo Koond, and another at the Tootha, are all the irrigation works that I would recommend for immediate sanction.

59 But it will be very desirable for the rapid and convenient construction of the proposed short canal to have a road from Bandoo Ghat to the Grand Trunk Road practicable at all seasons. The present road is a very good fair-weather track, and partially bridged from Dhree (via Tilothoo) to Akberpoor, and a mule road exists from Sasseram to Tilothoo. From Akberpoor to Bandoo (7 miles) the road, though practicable for carts, is a very indifferent track and quite unbridged.

60 The construction of a line of road from Bandoo to Sasseram or Dhree, or some intermediate point on the Grand Trunk Road, is connected with the project for irrigation in another way. For with reference to what I stated in paragraph 32 concerning the Dhoo Koond Reservoirs, the adoption of a line joining the Grand Trunk Road between Sasseram and Dhree would perhaps enable us to dispense with the Sasseram and Tilothoo Road, and occupy the large site for reservoirs spoken of in the paragraph quoted.

61 Unconnected with the irrigation project, a road from Sasseram to Bandoo is very important for the general traffic of the country, and specially for the Palamow coal. Bandoo is about 10 miles from the Coal Field, and the addition of 40 miles of road to the line above referred to would give the means of bringing this

coal into the markets on the Ganges. It has, I believe, been proposed to make a road from Palamow to Sherghotty, and thence to carry the coal by the Patna and Gya Road to the former city.

But I would suggest that the line of road from Palamow to the Grand Trunk Road near Sasseram is preferable for the following reasons—unless, indeed, the difficulties of the country between Palamow and the mouth of the Koel shall be found very great:—

1st. The Palamow coal is more likely to be required up than down the line of the Ganges, because the Lower Provinces may be supplied from the Damoodah and Kurlurbalee Fields.

2nd. There is a great demand for coal for the Soane bridge and other Railway works in Shahabad, and the line of road from Palamow to the Soane opposite Badoo will secure the navigation of the Soane to such extent as it may be found practicable or advantageous to use it.

3rd. We may soon be able to afford water carriage from Badoo to Sasseram, and eventually to Arrah. Hence the road from Palamow to the Soane at the juncture of the Koel has a great advantage over the Sherghotty Line.

4th. The construction of the line of road from Palamow to near Sasseram could very conveniently be undertaken by the Executive Engineer entrusted with the irrigation works mentioned in the 56th and 57th paragraphs, as the whole will lie in a small compass. This is a practical advantage of no small importance while the difficulty of finding Engineers continues to be so great.

62. While on the subject of the transport of the Palamow coal, I beg to draw attention to the possibility of rendering the Koel River navigable. I have not seen the river myself except just at the mouth. But on a sketch map of the Palamow District, of which Mr. Campbell, the Agent of the Bengal Coal Company, obligingly allowed me to take a copy, I find it noted that the navigation of the Koel is impeded by a mass of rocks at Sicksieky, which might be removed by blasting. To remove these rocks would, I apprehend, cause a change in the declivity of the river unfavourable to navigation, but it is very possible that they may be avoided by cutting a channel with locks so as to pass round the obstacle and overcome the difference of level above and below it without drawing too heavily on the discharge of the river.

63. I have only now to add that it seems that the Soane affords abundance of water for the irrigation of a large portion of the Behar and Patna Districts in addition to Shahabad, while in the former districts I understand the want of water is even more urgent than in the latter.

64. In requesting orders on the proposed mode of carrying out the irrigation works (paragraphs 55 to 57), and with reference to the means of communication discussed in paragraphs 58 to 61, I beg most strongly to recommend that an examination of the country on the right bank of the Soane be undertaken next cold season, with the view to constructing canals for irrigation.

65 I venture to express a hope that I may be favoured with the Lieutenant Governor's orders on this report as early as possible, in order that I may frame my estimates accordingly, and make the nec- for Executive and Survey- in- to carry out such measures as

I have, &c,  
C H DICKENS, *Captain*

## PUBLIC WORKS DEPARTMENT

### REVENUE

No 11 of 1856

### OUR GOVERNOR GENERAL OF INDIA IN COUNCIL

With your letter in this Department dated the 19th October (No 9) 1855, you submit for our favorable consideration a plan by Captain C H Dickens of the Bengal Artillery, for the irrigation of the Districts of Shahabad and Behar

2 You state that you attach "the highest importance to the various objects proposed by Captain Dickens" and placing "great reliance on the accuracy and sufficiency of the data on which his project is founded, and in full confidence that the result of this important measure will be peculiarly remunerative, and in every point of view beneficial to the state" you solicit us to give such a general sanction to the undertaking as shall enable you, on the submission of complete estimates for any portion of the work, to authorize its immediate execution

3 The total cost of the work is roughly estimated by Captain Dickens at sixty one lacs of Rupees, or, adding the half cost of the dam at Bundoo which is excluded as chargeable to a canal to be hereafter made of the Same for the purpose of irrigating Behar, to nearly sixty five lacs. Lieutenant Colonel Baker has examined the estimates and, with the exception of the Soane dam which he thinks will cost in a than is supposed he thinks that they "give as far an approximation and can now be obtained to the probable cost of the works"

4 We have carefully considered the whole project, we doubt not that an improved system of irrigation would greatly benefit the districts alluded to, and we think it probable that the undertaking might yield an adequate pecuniary return, but we would remind you that the Provinces of Behar and Benares are the most favored of any portion of India in their exemption from the calamities of drought on the one hand and of excessive inundation on the other, and we think therefore that other parts of our Territories claim your attention for works of this character more urgently than the Behar Districts. The subject however is on



which can only be considered in the Annual Budget of Public Works for India and with respect to the existing state of our finances. In the meantime the preparation of detailed Surveys and Estimates may be proceeded with, so that no time may be lost when the fitting opportunity shall arrive for conveying to you the authority which you solicit.

5. We desire that you will communicate to Captain Dickens through the proper channel, the high sense which we entertain of his services, and we fully concur in the opinion recorded by you that he is "deserving of the highest praise for the great care and ability with which he has conducted the enquiry up to the present point, for the great amount of field work done, and of valuable local information obtained in so short a time, and with such very little assistance, and for the clear and concise manner in which he has laid before Government the result of his labours."

We are, &c.,

(Sd.) W. H. SYKES

AND OTHER DIRECTORS.

LONDON, }  
11th June 1856. }

*Extracts containing estimates of the quantities and cost of water raised by the Native methods and required for irrigation of the crops.*

The following Table is extracted from the *Calcutta Gleanings in Science*, Vol. I. (1830), page 205.

"A Table showing the performance and its cost, in raising water from 10 to 25 feet by different methods of employing animal power. The expense of each labourer is put at 2 annas (3 pence) per diem, except in the instance of the walking beam, just half as much more on account of wear and tear of machine.

| No. | Height raised in feet. | No. of persons equivalent. | Method.          | Stages. | Loads per hour. | CUBIC FEET. |           | Hours labour. | TOTAL PERFORMANCE IN THE PERIOD. |            | Hogsheads per man. | Hogsheads per Rupee. | Period of labour. |
|-----|------------------------|----------------------------|------------------|---------|-----------------|-------------|-----------|---------------|----------------------------------|------------|--------------------|----------------------|-------------------|
|     |                        |                            |                  |         |                 | Per load.   | Per hour. |               | Cubic feet.                      | Hogsheads. |                    |                      |                   |
| 1   | 10                     | 5                          | Baling* ...      | 2       | 1,200           | 0.33        | 400       | 6             | 2,400                            | 300        | 60                 | 480                  | Whole day.        |
| 2   | 11                     | 3                          | Bullocks ...     | 1       | 41              | 1.75        | 77        | 6             | 462                              | 57.75      | 10.5               | 312                  | Half day.         |
| 3   | 11                     | 1                          | Walking beam ... | 1       | 800             | 0.50        | 400       | 8             | 3,200                            | 400        | 400                | 2,250                | Whole day.        |
| 1   | 45                     | 50                         | Baling ...       | 10      | 1,200           | 0.33        | 400       | 6             | 2,400                            | 300        | 0                  | 48                   | } Whole day.      |
| 2   | 45                     | 5                          | Bullocks ...     | 1       | 32              | 1.75        | 56        | 12            | 672                              | 84         | 16.8               | 135                  |                   |
| 3   | 45                     | 6                          | Walking beam ... | 4       | 800             | 0.50        | 400       | 12            | 4,800                            | 600        | 100                | 533                  |                   |
| 4   | 45                     | 100                        | Baling ...       | 10      | 1000            | 0.33        | 332       | 12            | 3,948                            | 498        | 5                  | 40                   |                   |

\* "Tossing water by means of basket ladles or scoops held by ropes, from one level to another."

CLEANINGS IN SCIENCE (CALCUTTA 1830), VOLUME II., PAGE 29—"A *latka* from a well which is 36 feet to the water from surface, in half an hour drew 1,357 lbs of water; two men usually work from sun rise to 9 o'clock, and from 3 o'clock to sun set, or rather until dark. When the depth is moderate 3 men with 2 *latkas* water from about  $\frac{1}{4}$ ds of an acre to  $\frac{1}{3}$ rd, daily.

"Three men and two oxen work a *molk* from morning until evening, with a refreshment only of about  $\frac{1}{4}$ ths of an hour. In a well 33 feet from the surface to the water, a *molk* in half an hour drew 7,210 lbs; but such superiority over the *latkas* is not admitted by the natives, who contend that three *latkas* wrought by four men are equal to a *molk* wrought by three men and two oxen. Thus, however, I have no doubt is a mistake, unless when the water is very near the surface."

Table extracted from Madras Engineer Papers, Vol. II. (1846)

| Method of Baling.                          | Height raised in feet. | No. of men or bullocks employed. |           | Lifts per hour | CUBIC FEET |          | No. of hours labour | Total performance in the time. | EFFECT OF LABOUR.              |                            |                                       |
|--------------------------------------------|------------------------|----------------------------------|-----------|----------------|------------|----------|---------------------|--------------------------------|--------------------------------|----------------------------|---------------------------------------|
|                                            |                        | Men.                             | Bullocks. |                | Per lift.  | Per hour |                     |                                | Raised a foot high per minute. | Raised a foot high per day | Delivery per Rope raised a foot high. |
|                                            |                        |                                  |           |                |            |          |                     |                                |                                |                            |                                       |
| 1 Freestah (or Ldg)                        | 10                     | 2                                | 0         | 89             | 144        | 260      | 6                   | 3000                           | 2523                           | 80000                      | 80000                                 |
| 2 "do                                      | 20                     | 2                                | 0         | 289            | 144        | 470      | 6                   | 3502                           | 1452                           | 22148                      | 154704                                |
| 3 "do                                      | 20                     | 2                                | 0         | 289            | 144        | 341      | 6                   | 3304                           | 1478                           | 22254                      | 215701                                |
| 4 Basket across                            | 10                     | 2                                | 0         | 1320           | 4          | 410      | 6                   | 2040                           | 333                            | 26100                      | 24100                                 |
| 5 Common Hillort Cup-pilay (or Molk)       | 11                     | 0                                | 1         | 44             | 173        | 77       | 10                  | 971                            | 11110                          | 1016302                    | 84578                                 |
| 6 "do                                      | 25                     | 0                                | 1         | 60             | 3          | 140      | 6                   | 1040                           | 60                             | 21000                      | 115000                                |
| 7 "do                                      | 45                     | 0                                | 1         | 32             | 173        | 60       | 12                  | 678                            | 47                             | 3078                       | 161700                                |
| 8 Better Cup-pilay in Horticultural Garden | 15                     | 0                                | 1         | 150            | 137        | 250      | 8                   | 10708                          | 204                            | 2514                       | 132001                                |
| 9 Common Pump                              | 10                     | 1                                | 0         | 60             | per min.   | 440      | 8                   | 3410                           | 20                             | 3510                       | 122000                                |

N. B.—This table is the result of experience gained in unwatering the foundation of a bastion of Fort St. George.

From the Calcutta Engineer's Journal, March 1861, page 33.

"The second source of supply, viz wells, is the one solely used this year for land situated above 6 miles from the canals; but from the failure of the rain crop, and the consequent scarcity of cattle forage, this method can only be adopted to a very limited extent, as the immense area of uncultivated land in the Damb at present shows.

"The area of wheat land that can be irrigated by two pairs of bullocks working one leather bag is about 4 acres, or barley 8 acres.

"The practice of watering is as follows—

"A wheel or axle, formed into a bag, is suspended at the end of a stout rope, which is rarnel over a wheel fixed about 8 feet above the well's mouth. When the bag is filled, the other end of the rope is attached by a loop and peg to the yoke of one pair of bullocks, which are then driven down the slope from the well's mouth. When the bullocks reach the foot of the slope, the bag has arrived at the surface of the ground, where it is emptied by the attendants. In the meantime the second pair of bullocks has arrived at the top of the slope where the wheel is fixed, in order

to be ready for the next lift. These two pairs of bullocks require the attendance of three men.

"One driver, one to fill and empty the bag, and the third, who under any system of Irrigation would be required, to guide the water into the proper channels.

"From personal measurement we deduce that a leather bag as used in the North-West Provinces contains 4.5 (four and a half) cubic feet, and that two pair of bullocks, relieving each other in the manner above described, will raise this bag full of water to the surface of the ground forty times in an hour. Supposing the bullocks work ten hours a day, and taking ninety days as the working season, we have the following result:— $4.5 \times 40 \times 10 \times 90 = 162,000$  cubic feet. One acre  $\approx 43,560$  superficial feet.  $\frac{162,000}{43,560} \approx 3.72$  acres, covered 1 foot deep with water, as the result of the labour of two pairs of bullocks and three men, working ten hours a day for ninety days. The difference between these figures and the previous statement that water, equivalent to a rainfall of 15 inches, is necessary for the wheat crop, is accounted for by the usual Christmas rains, which even this year have not failed us. From the above description of the well system of Irrigation, it will be seen that it is very expensive, and can only be of very restricted application.

"Beside the objection of expense in working, this system is quite impracticable in large tracts of the Doab, as the sandy nature of the sub-soil entails the necessity of masonry wells, and it is quite plain that such a well, costing at least Rs. 500 to even every 20 acres, is entirely out of the question. The ordinary well is simply a round hole, lined, for a few feet of its height from the bottom, with a wooden, or plaited brush-wood casing."

# APPENDIX B

DETAILED ESTIMATES ON WHICH THE PROJECT OF 1901 IS BASED

## NO 1, EXCAVATION OF CHANNEL.

### Part I—Western Soane Canal.

| Names of Branches.                                                            | No of Miles.            | DEPTH    |       |      | Width at bottom | Cubic feet in each Mile | Total of each Branch. |
|-------------------------------------------------------------------------------|-------------------------|----------|-------|------|-----------------|-------------------------|-----------------------|
|                                                                               |                         | Greatest | Least | Mean |                 |                         |                       |
| A<br>Western Canal }<br>Main Line }                                           | Lock Channel            | 21 1     | 3 1   | 17 3 | 73              | 12 130 010              | 117,271,107           |
|                                                                               | 1                       | 22 3     | 2 0   | 15 8 | 73              | 9 097 777               |                       |
|                                                                               | 2                       | 36 0     | 1 3   | 24 9 |                 | 21,592 070              |                       |
|                                                                               | 3                       | 32 3     | 20 2  | 24 7 |                 | 14,263 110              |                       |
|                                                                               | 4                       | 21 0     | 16 3  | 21 5 |                 | 17,513 400              |                       |
|                                                                               | 5                       | 26 0     | 17 6  | 20 6 |                 | 13 029 535              |                       |
|                                                                               | 6                       | 21 2     | 14 1  | 19 7 |                 | 12 256 317              |                       |
|                                                                               | 7                       | 20 5     | 12 1  | 17 6 |                 | 10 380 715              |                       |
|                                                                               | 8                       | 13 5     | 10 3  | 12 3 |                 | 6,325 635               |                       |
|                                                                               | 9                       | 11 1     | 6 9   | 9 3  |                 | 1 280 669               |                       |
|                                                                               | 10                      | 8 7      | 4 6   | 6 7  |                 | 2 360 610               |                       |
|                                                                               | 10 73                   | 6 6      | 5 6   | 5 9  |                 | 720 675                 |                       |
|                                                                               | Escape Channel 5 Miles. |          |       | 10   | 73              | 207,007 000             |                       |
| ABSTRACT                                                                      |                         |          |       |      |                 |                         | 1 a.                  |
| 117,271 107 Cubic feet of excavation at Rs. 4 per 1 000 feet in first 8 miles |                         |          |       |      |                 | 4 69 065                |                       |
| 30 796,920 Cubic feet of excavation at 1 a. 2-8 per 1,000 feet in remainder   |                         |          |       |      |                 | 76 992                  |                       |
| Contingencies at 5 per cent.                                                  |                         |          |       |      |                 | 27 701                  |                       |
| Total Cu's Rs                                                                 |                         |          |       |      |                 | 5 73,381                |                       |
| B<br>Arrah Branch<br>above Lances-<br>sagar branch<br>head.                   | 11th of 11th            | 13 8     | 4 1   | 9 1  | 12 5            | 3 021,000               | 115,068,117           |
|                                                                               | 12th                    | 13 1     | 6 0   | 11 1 |                 | 3 621 110               |                       |
|                                                                               | 13th                    | 11 1     | 6 0   | 10 7 |                 | 3,363 800               |                       |
|                                                                               | 14th                    | 16 3     | 6 7   | 10 5 |                 | 7 11 015                |                       |
|                                                                               | 15th                    | 13 7     | 9 1   | 11 1 |                 | 7 131,005               |                       |
|                                                                               | 16th                    | 10 0     | 6 7   | 8 7  |                 | 2,206 540               |                       |
|                                                                               | 17th                    | 12 8     | 4 7   | 6 7  |                 | 2,363 967               |                       |
|                                                                               | 18th                    | 13 0     | 10 9  | 11 8 |                 | 3 780 820               |                       |
|                                                                               | 19th                    | 17 2     | 6 2   | 11 9 |                 | 7 121,910               |                       |
|                                                                               | 20th                    | 9 1      | 6 7   | 7 3  |                 | 2 063,120               |                       |
|                                                                               | 21st                    | 13 9     | 2 0   | 9 0  |                 | 2,991 820               |                       |
|                                                                               | 22nd                    | 12 1     | 4 1   | 10 6 |                 | 3,277,005               |                       |
|                                                                               | 23rd                    | 11 8     | 6 7   | 7 9  |                 | 2,329 565               |                       |
|                                                                               | 24th                    | 9 6      | 5 5   | 7 1  |                 | 2,125,580               |                       |
|                                                                               | 25th                    | 7 0      | 4 1   | 6 1  |                 | 1 730 070               |                       |
|                                                                               | 26th                    | 9 1      | 3 6   | 7 3  |                 | 2 165,740               |                       |
| Carried over                                                                  |                         |          |       |      |                 | 41 453 017              |                       |

| Names of Branches.                                                          | No. of Miles.                       | DEPTHS.   |        |       | Width at bottom. | Cubic feet in each Mile. | Total of each Branch. |
|-----------------------------------------------------------------------------|-------------------------------------|-----------|--------|-------|------------------|--------------------------|-----------------------|
|                                                                             |                                     | Greatest. | Least. | Mean. |                  |                          |                       |
| Brought forward                                                             | .....                               | ...       | ...    | ...   | ...              | 44,433,045               | 148,068,117           |
|                                                                             | 27th                                | 9·7       | 6·8    | 8·6   | 42·5             | 2,528,245                |                       |
|                                                                             | 28th                                | 12·5      | 9·1    | 10·4  | ...              | 3,241,730                |                       |
|                                                                             | 29th                                | 13·3      | 5·5    | 8·3   | ...              | 2,414,215                |                       |
|                                                                             | 30th                                | 13·1      | 10·6   | 11·4  | ...              | 3,611,545                |                       |
|                                                                             | 31st                                | 10·8      | 4·7    | 8·0   | ...              | 2,280,720                |                       |
|                                                                             | 32nd                                | 11·2      | 5·0    | 8·0   | ...              | 2,318,880                |                       |
|                                                                             | 33rd                                | 14·6      | 6·8    | 12·3  | ...              | 1,342,115                |                       |
|                                                                             | Escape Channel 1½ miles to Soane... | ...       | ...    | 10·0  | ...              | 4,554,000                |                       |
|                                                                             |                                     |           |        |       |                  |                          | 66,724,495            |
| ABSTRACT.                                                                   |                                     |           |        |       |                  |                          | Rs.                   |
| 66,724,495 Cubic feet of excavation at Rs. 2·8 per 1,000 feet               |                                     |           |        |       |                  | 1,66,811                 |                       |
| Contingencies at 5 per cent. ... ..                                         |                                     |           |        |       |                  | 8,840                    |                       |
| Total Co.'s Rs. ...                                                         |                                     |           |        |       |                  | 1,75,151                 |                       |
| C.<br>Arrah Branch<br>above Peeroo<br>Branch Head.                          | ·67 of 33rd                         | 12·4      | 9·9    | 10·8  | 31               | 1,858,800                | 23,654,665            |
|                                                                             | 34th                                | 12·6      | 7·7    | 9·6   | ...              | 2,282,560                |                       |
|                                                                             | 35th                                | 8·2       | 5·8    | 7·3   | ...              | 1,636,405                |                       |
|                                                                             | 36th                                | 6·3       | 3·7    | 5·4   | ...              | 1,138,195                |                       |
|                                                                             | 37th                                | 11·7      | 4·1    | 8·9   | ...              | 1,925,800                |                       |
|                                                                             | 38th                                | 12·9      | 6·8    | 9·8   | ...              | 2,388,620                |                       |
|                                                                             | 39th                                | 11·0      | 4·1    | 7·9   | ...              | 1,813,745                |                       |
|                                                                             | 40th                                | 5·2       | 1·2    | 3·2   | ...              | 621,200                  |                       |
|                                                                             | ·28 of 41st                         | 7·4       | 3·6    | 4·7   | ...              | 274,140                  |                       |
|                                                                             | Escape Channel 4 Miles to Bunas.    |           |        | 10·0  | 31               | 9,715,200                |                       |
| ABSTRACT.                                                                   |                                     |           |        |       |                  |                          | Rs.                   |
| 23,654,665 Cubic feet of excavation at Rs. 2·8 per 1,000 cubic feet. ... .. |                                     |           |        |       |                  | 59,136                   |                       |
| Contingencies at 5 per cent. ... ..                                         |                                     |           |        |       |                  | 2,957                    |                       |
| Total Co.'s Rs. ...                                                         |                                     |           |        |       |                  | 62,093                   |                       |
| D.<br>Arrah Branch<br>above Nansau-<br>gor Branch<br>Head.                  | 0·72 of 41st                        | 7·9       | 6·2    | 6·8   | 23               | 887,855                  |                       |
|                                                                             | 42nd                                | 7·9       | 4·5    | 6·4   | ...              | 1,125,605                |                       |
|                                                                             | 43rd                                | 7·5       | 2·4    | 5·4   | ...              | 894,045                  |                       |
|                                                                             | 44th                                | 6·6       | 3·7    | 5·5   | ...              | 930,395                  |                       |
|                                                                             | 45th                                | 6·5       | 4·9    | 5·8   | ...              | 993,650                  |                       |
|                                                                             | 46th                                | 8·4       | 6·1    | 6·6   | ...              | 1,170,530                |                       |
| Carried over                                                                | .....                               | ...       | ...    | ...   | ...              | 6,002,080                | 238,147,277           |





|                                                                                                                                                                                                                                                                                            |        |             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------|
| Brought forward                                                                                                                                                                                                                                                                            |        | 293,088,067 |
| <b>G</b>                                                                                                                                                                                                                                                                                   |        |             |
| <i>Peeroo Branch above the Jugdispoor Branch Head, 11½ miles, with 6 miles of escape to the Hunas, total 17½ miles, 17 feet wide at bottom, average depth of cutting say 8 feet, slopes 1½ to 1. Thus <math>17½ \times 5250 \times 8 \times (17 + \frac{1}{2} + 8) =</math> cubic feet</i> |        |             |
| <i>Cost</i>                                                                                                                                                                                                                                                                                |        | <i>Rs.</i>  |
| 21,136,500 Cubic feet at Rs. 2 per 1,000 cubic feet                                                                                                                                                                                                                                        | 42,271 |             |
| Contingencies at 5 per cent                                                                                                                                                                                                                                                                | 2,111  |             |
| Total cost Rs.                                                                                                                                                                                                                                                                             | 45,018 | 21,136,500  |
| <b>H</b>                                                                                                                                                                                                                                                                                   |        |             |
| <i>Peeroo Branch below Jugdispoor Branch Head, 17½ miles to tail escape in Nala, width at bottom 11 feet, average depth say 5 feet, slopes as before. Thus <math>17½ \times 5250 \times 5 \times (11 + 5 + 2½) =</math> cubic feet</i>                                                     |        |             |
| <i>Cost</i>                                                                                                                                                                                                                                                                                |        | <i>Rs.</i>  |
| 8,517,00 Cubic feet at Rs. 2 per 1,000 cubic feet                                                                                                                                                                                                                                          | 17,034 |             |
| Contingencies at 5 per cent.                                                                                                                                                                                                                                                               | 8,555  |             |
| Total cost Rs.                                                                                                                                                                                                                                                                             | 17,919 | 8,517,000   |
| <b>I</b>                                                                                                                                                                                                                                                                                   |        |             |
| <i>Jugdispoor Branch, 17 miles to tail escape in Charyee, width at bottom 10½ feet, average depth say 5 feet. Thus <math>17 \times 5250 \times 5 \times (10½ + 5 + 2½) =</math> cubic feet</i>                                                                                             |        |             |
| <i>Cost</i>                                                                                                                                                                                                                                                                                |        | <i>Rs.</i>  |
| 8,078,100 Cubic feet at Rs. 2 per 1,000 cubic feet                                                                                                                                                                                                                                         | 16,157 |             |
| Contingencies at 5 per cent                                                                                                                                                                                                                                                                | 808    |             |
| Total cost Rs.                                                                                                                                                                                                                                                                             | 16,965 | 8,078,100   |
| <b>J</b>                                                                                                                                                                                                                                                                                   |        |             |
| <i>Raneepoor Branch above escape, 22 miles, with escape to Jhoree Naflee 2 miles, total 24 miles, width at bottom 16 feet, average depth of cutting say 7 feet. Thus <math>24 \times 5250 \times 7 \times (16 + 7 + 3½) =</math> cubic feet</i>                                            |        |             |
| <i>Cost</i>                                                                                                                                                                                                                                                                                |        | <i>Rs.</i>  |
| 23,500,560 Cubic feet at Rs. 2 per 1,000 cubic feet                                                                                                                                                                                                                                        | 47,013 |             |
| Contingencies at 5 per cent.                                                                                                                                                                                                                                                               | 2,350  |             |
| Total cost Rs.                                                                                                                                                                                                                                                                             | 49,363 | 23,500,560  |
| <b>K.</b>                                                                                                                                                                                                                                                                                  |        |             |
| <i>Panerpoor Branch below escape, 13½ miles including tail escape to Hunas width at bottom 12½ feet, average depth say 5 feet. Thus <math>13½ \times 5250 \times 5 \times (12½ + 5 + 2½) =</math> cubic feet</i>                                                                           |        |             |
| <i>Cost</i>                                                                                                                                                                                                                                                                                |        | <i>Rs.</i>  |
| 7,177,100 Cubic feet at Rs. 2 per 1,000 cubic feet                                                                                                                                                                                                                                         | 14,354 |             |
| Contingencies at 5 per cent                                                                                                                                                                                                                                                                | 718    |             |
| Total cost Rs.                                                                                                                                                                                                                                                                             | 15,072 | 7,177,100   |
| Carried over                                                                                                                                                                                                                                                                               |        | 3,183,957   |



|                                                                                                                                                                                        |                                                                                          |     |     |             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----|-----|-------------|
| Brought forward ... ..                                                                                                                                                                 |                                                                                          |     |     | 531,343,989 |
| <i>Cost.</i>                                                                                                                                                                           |                                                                                          |     |     | <i>Rs.</i>  |
| 12,012,000                                                                                                                                                                             | Cubic feet at Rs. 2 per 1,000 ... ..                                                     | ... | ... | 24,024      |
|                                                                                                                                                                                        | Contingencies at 5 per cent. ... ..                                                      | ... | ... | 1,201       |
| Total cost Rs. ... ..                                                                                                                                                                  |                                                                                          |     |     | 25,225      |
| <b>T.</b>                                                                                                                                                                              |                                                                                          |     |     |             |
| <i>Buxar Branch to end</i> , 18 miles to tail escape into Nala, 10½ feet wide at bottom, average depth of cutting say 5 feet.                                                          |                                                                                          |     |     |             |
|                                                                                                                                                                                        | $18 \times 5,280 \times 5 \times (10\frac{1}{2} + 5 + 2\frac{1}{2}) =$ cubic feet ... .. | ... | ... | 8,553,600   |
| <i>Cost.</i>                                                                                                                                                                           |                                                                                          |     |     | <i>Rs.</i>  |
| 85,53,600                                                                                                                                                                              | Cubic feet at Rs. 2 per 1,000 ... ..                                                     | ... | ... | 17,107      |
|                                                                                                                                                                                        | Contingencies at 5 per cent. ... ..                                                      | ... | ... | 855         |
| Total cost Rs. ... ..                                                                                                                                                                  |                                                                                          |     |     | 17,962      |
| <b>U.</b>                                                                                                                                                                              |                                                                                          |     |     |             |
| <i>Doomraon Branch</i> , 13 miles to tail escape in Kao; width at bottom 7 feet, depth of cutting say 4 feet on average.                                                               |                                                                                          |     |     |             |
|                                                                                                                                                                                        | $13 \times 5,280 \times 4 \times (7 + 4 + 2) =$ cubic feet ... ..                        | ... | ... | 3,569,280   |
| <i>Cost.</i>                                                                                                                                                                           |                                                                                          |     |     | <i>Rs.</i>  |
| 3,569,280                                                                                                                                                                              | Cubic feet at Rs. 2 per 1,000 ... ..                                                     | ... | ... | 7,138       |
|                                                                                                                                                                                        | Contingencies at 5 per cent. ... ..                                                      | ... | ... | 357         |
| Total cost Rs. ... ..                                                                                                                                                                  |                                                                                          |     |     | 7,495       |
| <b>V.</b>                                                                                                                                                                              |                                                                                          |     |     |             |
| <i>Buradhee Branch</i> , 13 miles to tail escape in Nala; width at bottom 8½ feet, average depth of cutting say 5 feet.                                                                |                                                                                          |     |     |             |
|                                                                                                                                                                                        | $13 \times 5280 \times 5 \times (8\frac{1}{2} + 5 + 2\frac{1}{2}) =$ cubic feet ... ..   | ... | ... | 5,577,000   |
| <i>Cost.</i>                                                                                                                                                                           |                                                                                          |     |     | <i>Rs.</i>  |
| 5,577,000                                                                                                                                                                              | Cubic feet at Rs. 2 per 1,000 ... ..                                                     | ... | ... | 11,154      |
|                                                                                                                                                                                        | Contingencies at 5 per cent. ... ..                                                      | ... | ... | 558         |
| Total cost Rs....                                                                                                                                                                      |                                                                                          |     |     | 11,712      |
| <b>W.</b>                                                                                                                                                                              |                                                                                          |     |     |             |
| <i>Chowsa Branch above the Kochus Branch Head</i> , 6½ miles, with escape of 7 miles to Dhurmouttee, total 13½ miles; width at bottom 26 feet, depth of cutting say 8 feet on average. |                                                                                          |     |     |             |
|                                                                                                                                                                                        | $13\frac{1}{2} \times 5280 \times 8 \times (26 + 8 + 4) =$ cubic feet ... ..             | ... | ... | 21,669,120  |
| <i>Cost.</i>                                                                                                                                                                           |                                                                                          |     |     | <i>Rs.</i>  |
| 21,669,120                                                                                                                                                                             | Cubic feet at Rs. 2-8 per 1,000 ... ..                                                   | ... | ... | 54,148      |
|                                                                                                                                                                                        | Contingencies at 5 per cent. ... ..                                                      | ... | ... | 2,707       |
| Total cost Rs....                                                                                                                                                                      |                                                                                          |     |     | 56,855      |
| Carried over ... ..                                                                                                                                                                    |                                                                                          |     |     | 570,512,989 |

|                                                                                                                                                                                                |                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Brought forward .. .. .                                                                                                                                                                        | 570,512,989        |
| <b>X</b>                                                                                                                                                                                       |                    |
| <i>Chowra Branch below Kochus Branch Head to escape, 12½ miles with 2 miles of escape to Koochana Nullee, total 14½ miles; width at bottom 21 feet, depth of cutting say 7 feet on average</i> |                    |
| $14\frac{1}{2} \times 6250 \times 7 \times (21 + 7 + 3) = \text{cubic feet}$                                                                                                                   | 10,881,480         |
| <i>Cost</i>                                                                                                                                                                                    | <i>Rs</i>          |
| 10,881,480 Cubic feet at Rs. 2 per 1000 ..                                                                                                                                                     | 33,763             |
| Contingencies at 5 per cent ..                                                                                                                                                                 | 1,688              |
| <b>Total cost Rs</b>                                                                                                                                                                           | <b>35,451</b>      |
| <b>Y</b>                                                                                                                                                                                       |                    |
| <i>Chowra Branch to end, 15 miles, to tail escape into Kurumnassa; width at bottom 18½ feet, depth of cutting say 6 feet on average</i>                                                        |                    |
| $15 \times 6250 \times 6 \times (18\frac{1}{2} + 6 + 3) = \text{cubic feet}$                                                                                                                   | 13,069,000         |
| <i>Cost</i>                                                                                                                                                                                    | <i>Rs</i>          |
| 13,069,000 Cubic feet at Rs. 2 per 1000 ..                                                                                                                                                     | 26,136             |
| Contingencies ..                                                                                                                                                                               | 1,307              |
| <b>Total cost Rs.</b>                                                                                                                                                                          | <b>27,443</b>      |
| <b>Z.</b>                                                                                                                                                                                      |                    |
| <i>Kochus Branch 13 miles, to tail escape into Dhurmouttee; width at bottom 8½ feet, depth of cutting say 5 feet</i>                                                                           |                    |
| $13 \times 6250 \times 5 \times (8\frac{1}{2} + 5 + 2\frac{1}{2}) = \text{cubic feet}$                                                                                                         | 5,577,000          |
| <i>Cost</i>                                                                                                                                                                                    |                    |
| 5,577,000 Cubic feet at Rs. 2 per 1000 ..                                                                                                                                                      | 11,154             |
| Contingencies at 5 per cent ..                                                                                                                                                                 | 558                |
| <b>Total cost Rs.</b>                                                                                                                                                                          | <b>11,712</b>      |
| <b>Grand Total cubic feet of Channel Excavation in Western Boane Canal</b>                                                                                                                     | <b>608,219,100</b> |

[illegible]

| Names of Branches.                                       | No of miles. | Depths    |        |      | Width at bottom | Cut of each Mile. | Total of each Branch. |
|----------------------------------------------------------|--------------|-----------|--------|------|-----------------|-------------------|-----------------------|
|                                                          |              | Greatest. | Least. | Mean |                 |                   |                       |
| Brought forward                                          | -            |           |        |      |                 |                   | 128 106 811           |
| C                                                        |              |           |        |      |                 |                   |                       |
| Patna Branch between Jakhaura and Kojhassan Branch Head. | 21st         | 88        | 55     | 70   | 315             | 1 687 615         |                       |
|                                                          | 22nd         | 55        | 31     | 43   |                 | 047 120           |                       |
|                                                          | 23rd         | 57        | 19     | 43   |                 | 1 002 620         |                       |
|                                                          | 24th         | 60        | 31     | 45   |                 | 1 010 510         |                       |
|                                                          | 25th         | 121       | 12     | 56   |                 | 1 745 71          |                       |
|                                                          | 26th         | 101       | 67     | 81   |                 | 2 000 95          |                       |
|                                                          | 27th         | 126       | 48     | 71   |                 | 1 809 600         |                       |
|                                                          | 28th         | 111       | 66     | 87   |                 | 2 168 675         |                       |
|                                                          | 29th         | 73        | 26     | 52   |                 | 1 170 175         |                       |
|                                                          | 30th         | 60        | 11     | 39   |                 | 811 77            |                       |
|                                                          | 31st         | 135       | 17     | 101  |                 | 2 710 800         |                       |
|                                                          | 32nd         | 101       | 39     | 73   |                 | 1 775 2           |                       |
|                                                          | 33rd         | 01        | 28     | 57   |                 | 1 337 600         |                       |
|                                                          | 34th         | 114       | 09     | 39   |                 | 831 540           |                       |
| Escape Channel 7 000 feet to Seane                       |              |           |        | 100  | 315             | 1 145 000         | 27 330 840            |

## ABSTRACT

12

1,330 850 cubic feet of excavation at 1 s. 2 8 per 1 000  
Contingencies at 5 per cent

55 827  
27 91

Total Cost Rs. 54 618

|                                                                  |      |     |    |    |     |            |           |
|------------------------------------------------------------------|------|-----|----|----|-----|------------|-----------|
| d                                                                |      |     |    |    |     |            |           |
| Patna Branch between Kojhassan and Laloveralee-gunj Branch Head. | 35th | 129 | 57 | 80 | 295 | 2 012 10   |           |
|                                                                  | 36th | 111 | 73 | 87 |     | 1 833 110  |           |
|                                                                  | 37th | 67  | 33 | 48 |     | 1 111 10   |           |
|                                                                  | 38th | 81  | 60 | 68 |     | 1 1 0910   |           |
|                                                                  | 39th | 86  | 42 | 71 |     | 1 212 000  |           |
|                                                                  | 40th | 111 | 15 | 80 |     | 1 776 600  |           |
|                                                                  | 41st | 119 | 22 | 61 |     | 1 323 70   |           |
|                                                                  | 42nd | 111 | 30 | 53 |     | 1 011 600  |           |
|                                                                  | 43rd | 121 | 27 | 75 |     | 1 671 500  |           |
|                                                                  | 44th | 69  | 47 | 50 |     | 983 37     |           |
|                                                                  | 45th | 111 | 72 | 66 |     | 1 201 160  |           |
|                                                                  | 46th | 79  | 47 | 65 |     | 1 2 6 870  |           |
|                                                                  | 47th | 83  | 41 | 51 |     | 1 087 57   |           |
|                                                                  | 48th | 15  | 26 | 37 |     | 7 7 8 00   |           |
|                                                                  | 49th | 106 | 41 | 85 |     | 1 8 5 7 00 |           |
|                                                                  | 50th | 103 | 55 | 81 |     | 1 770 700  |           |
|                                                                  | 51st | 101 | 53 | 71 |     | 1 600 800  |           |
|                                                                  | 52nd | 83  | 73 | 59 |     | 1 201 7    |           |
|                                                                  | 53rd | 60  | 31 | 33 |     | 625 37     |           |
|                                                                  | 54th | 56  | 34 | 45 |     | 888 87     |           |
| Carried over                                                     | -    |     |    |    |     | 28 23 17   | 153 737 1 |

[illegible]

|                                                                                                                                                                                                                                                                                        |  |                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------|
| Brought forward ..                                                                                                                                                                                                                                                                     |  | 2° 51° 661                            |
| <p><b>Cost</b></p> <p>29 110° 20 cubic feet at Rs. 2.8 per 1 000</p> <p>Contingencies at 5 per cent</p>                                                                                                                                                                                |  | <p>Rs.</p> <p>71 10°</p> <p>3,555</p> |
| Total cost Rs.                                                                                                                                                                                                                                                                         |  | 71 657                                |
| <p><b>g</b></p> <p>Jalkhaura Branch to tail escape in Poonpooon 21½ miles</p> <p>width at bottom 9 feet depth of cutting say</p> <p>5 feet on an average</p> <p><math>21\frac{1}{2} \times 5 \times 50 \times 5 \times (3 + 5 + 2\frac{1}{2}) = \text{cubic feet}</math></p>           |  | 10 0° 2° 000                          |
| <p><b>Cost</b></p> <p>10 0° 2,200 cubic feet at Rs. 2 per 1 000</p> <p>Contingencies at 5 per cent</p>                                                                                                                                                                                 |  | <p>Rs.</p> <p>21 311</p> <p>1 0°</p>  |
| Total cost Rs.                                                                                                                                                                                                                                                                         |  | 2° 111                                |
| <p><b>h</b></p> <p>Kojhassa Branch 27 miles; width at bottom 10½ feet</p> <p>average length of cutting say 5 feet.</p> <p><math>27 \times 5 \times 50 \times 5 \times (10\frac{1}{2} + 5 + 2\frac{1}{2}) = \text{cubic feet}</math></p>                                                |  | 1° 520 100                            |
| <p><b>Cost</b></p> <p>12 830 400 cubic feet at Rs. 2 per 1 000</p> <p>Contingencies at 5 per cent</p>                                                                                                                                                                                  |  | <p>Rs.</p> <p>2 64 1</p> <p>1,253</p> |
| Total cost Rs.                                                                                                                                                                                                                                                                         |  | 20,911                                |
| <p><b>i</b></p> <p>Palegunj Branch 14 miles; width at bottom 7 feet depth of</p> <p>cutting say 4 feet on the average</p> <p><math>14 \times 5 \times 50 \times 4 \times (7 + 4 + 2) = \text{cubic feet}</math></p>                                                                    |  | 3 513 510                             |
| <p><b>Cost</b></p> <p>3,813 510 cubic feet at Rs. 2 per 1 000</p> <p>Contingencies at 5 per cent</p>                                                                                                                                                                                   |  | <p>Rs.</p> <p>7 688</p> <p>381</p>    |
| Total cost Rs.                                                                                                                                                                                                                                                                         |  | 8 0° 2                                |
| <p><b>j</b></p> <p>Dhanpoor Branch 20 miles; width at bottom 14 feet depth</p> <p>of cutting on the average say 7 feet</p> <p><math>20 \times 5 \times 50 \times 7 \times (14 + 7 + 3\frac{1}{2}) = \text{cubic feet}</math></p>                                                       |  | 18 110 400                            |
| <p><b>Cost</b></p> <p>18 110 400 cubic feet at Rs. 2 per 1 000</p> <p>Contingencies at 5 per cent</p>                                                                                                                                                                                  |  | <p>Rs.</p> <p>36 221</p> <p>1 511</p> |
| Total cost Rs.                                                                                                                                                                                                                                                                         |  | 37 033                                |
| <p><b>k</b></p> <p>Tharoor Branch above Jannoor Branch II of 10 miles</p> <p>escaped to be into the main tail 11 miles; width</p> <p>at bottom 27 feet length of cutting say 10 feet.</p> <p><math>11 \times 5 \times 50 \times 10 \times (27 + 10 + 5) = \text{cubic feet}</math></p> |  | 23 612,57                             |
| Carried over =                                                                                                                                                                                                                                                                         |  | 2° 11° 2 1                            |

|                                                                                                                                           |                                             |     |     |             |
|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-----|-----|-------------|
| Brought forward ... ..                                                                                                                    |                                             |     |     | 365,473,021 |
| <b>U.</b>                                                                                                                                 |                                             |     |     |             |
| <i>Dadur Branch</i> , 12 miles; width at bottom 7 feet, depth of cutting say 4 feet on the average.                                       |                                             |     |     |             |
| $12 \times 5280 \times 4 \times (7 + 4 + 2) =$ cubic feet ... ..                                                                          |                                             |     |     | 3,294,720   |
| <i>Cost.</i>                                                                                                                              |                                             |     |     | Rs.         |
| 3,294,720                                                                                                                                 | cubic feet at Rs. 2 per 1,000               | ... | ... | 6,589       |
|                                                                                                                                           | Contingencies at 5 per cent.                | ... | ... | 329         |
| Total cost Rs. ...                                                                                                                        |                                             |     |     | 6,918       |
| <b>V.</b>                                                                                                                                 |                                             |     |     |             |
| <i>Hameednuggur Branch</i> , $15\frac{1}{2}$ miles; width at bottom 10 feet, depth of cutting say 5 feet on the average.                  |                                             |     |     |             |
| $15\frac{1}{2} \times 5280 \times 5 \times (10 + 5 + 2\frac{1}{2}) =$ cubic feet ... ..                                                   |                                             |     |     | 7,161,000   |
| <i>Cost.</i>                                                                                                                              |                                             |     |     | Rs.         |
| 7,161,000                                                                                                                                 | cubic feet at Rs. 2 per 1,000               | ... | ... | 14,322      |
|                                                                                                                                           | Contingencies at 5 per cent.                | ... | ... | 716         |
| Total cost Rs. ...                                                                                                                        |                                             |     |     | 15,038      |
| <b>W.</b>                                                                                                                                 |                                             |     |     |             |
| <i>Kutanga Branch</i> , 15 miles; $9\frac{1}{2}$ feet wide at bottom, depth of cutting say 5 feet on the average.                         |                                             |     |     |             |
| $15 \times 5280 \times 5 \times (9\frac{1}{2} + 5 + 2\frac{1}{2}) =$ cubic feet ... ..                                                    |                                             |     |     | 6,732,000   |
| <i>Cost.</i>                                                                                                                              |                                             |     |     | Rs.         |
| 6,732,000                                                                                                                                 | cubic feet at Rs. 2 per 1,000               | ... | ... | 13,464      |
|                                                                                                                                           | Contingencies at 5 per cent.                | ... | ... | 673         |
| Total cost Rs. ...                                                                                                                        |                                             |     |     | 14,137      |
| Grand total cubic feet of excavation }<br>in Eastern Soane Canal .. .. }                                                                  |                                             |     |     | 382,660,741 |
| <b>NO. 1, EXCAVATION OF CHANNEL.</b>                                                                                                      |                                             |     |     |             |
| <b>Part III. Lines for Navigation only.</b>                                                                                               |                                             |     |     |             |
| <b>I.</b>                                                                                                                                 |                                             |     |     |             |
| <i>Navigable line from the Dinapoor Branch Head to Patna</i> , 27 miles, width at bottom 20 feet, depth of cutting say 6 feet on average. |                                             |     |     |             |
| $27 \times 5,280 \times 6 \times (20 + 6 + 3) =$ cubic feet ... ..                                                                        |                                             |     |     | 24,805,440  |
| <i>Cost.</i>                                                                                                                              |                                             |     |     | Rs.         |
| 24,805,440                                                                                                                                | cubic feet of earth-work at Rs. 2 per 1,000 | ... | ... | 49,611      |
|                                                                                                                                           | Contingencies at 5 per cent.                | ... | ... | 2,485       |
| Total cost Rs. ...                                                                                                                        |                                             |     |     | 52,096      |
| Carried over ... ..                                                                                                                       |                                             |     |     | 24,805,440  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p align="center"><b>II</b></p> <p><i>Variable Lane from the Namangor Branch head to Area A</i><br/> 20 miles, width at bottom 20 feet, depth of cutting say 6 feet on average<br/> <math>20 \times 5,250 \times 6 \times (10 + 6 + 3) = \text{cubic feet}</math><br/> Cost<br/> 18,371,400 cubic feet of earth work at Rs. 2 per 1,000<br/> Contingencies at 5 per cent</p> <p align="right">Total cost Rs.</p>                                                                          | <p align="center">Brought forward</p> <p align="right">21,605,410</p> <p align="right">18,371,400</p> <p align="right">Rs.<br/>37,976</p> <p align="right">1,537</p> <p align="right">33,586</p> |
| <p align="center"><b>III</b></p> <p><i>Variable Lane from the Kachur Branch head to the Kurum masts above the Palmy Bridge</i> 27 miles 20 feet wide at bottom and 6 feet deep<br/> <math>27 \times 5,250 \times 6 \times (10 + 6 + 3) = \text{cubic feet}</math><br/> Cost<br/> Same as I atna navigable line ..</p>                                                                                                                                                                     | <p align="right">21,605,410</p> <p align="right">Rs.<br/>5,096</p>                                                                                                                               |
| <p align="center"><b>IV</b></p> <p><i>Variable Lane from the Kurum masts Part four parallel to the S. stream Branch as far as the head of the Main Navigational to Benares</i> 15 miles, 20 feet width at bottom and say 8 feet of excavation<br/> <math>15 \times 5,250 \times 8 \times (10 + 8 + 3) = \text{cubic feet}</math><br/> Cost<br/> 20,275,200 cubic feet at Rs. 2 per 1,000<br/> Contingencies at 5 per cent</p> <p align="right">Total cost Rs.</p>                         | <p align="right">20,275,200</p> <p align="right">Rs.<br/>40,540<br/>2,029</p> <p align="right">42,569</p>                                                                                        |
| <p align="center"><b>V</b></p> <p><i>Main Navigable Lane from the end of the above to the Gauges above Benares</i> 54 miles 20 feet wide at bottom depth of cutting 10 feet on average<br/> <math>54 \times 5,250 \times 10 \times (10 + 10 + 5) = \text{cubic feet}</math><br/> Cost<br/> 114,272,000 cubic feet Excavation at Rs. 2 5 per 1,000<br/> Contingencies at 5 per cent</p> <p align="right">Grand Total cubic feet of Excavation in Lines (a) }<br/> Navigation only .. }</p> | <p align="right">114,272,000</p> <p align="right">Rs.<br/>2,970<br/>14,781</p> <p align="right">310,401</p> <p align="right">2,23,146</p>                                                        |



*Note to the Estimate of the cost of Excavation.*

The mean depths entered in the column of the Estimates of the channels of which detailed levels have been taken are not arithmetical means on which the calculation of quantities are based; on the contrary these means are deduced from the quantities calculated from sections in which the depth is given at every 100 feet.

The berm has not been cut to an uniform height above the water line, but left at the level of the ground, excepting in cutting of greater depth the 15 feet where it is placed at 8 or 10 feet above water line as shown in Plate XXI.

The following Table gives an analysis of the rates. It is based on the sections given in Plate XXI., the "lift" being the calculated height of the centre of gravity of the spoil bank above the centre of gravity of the excavation, and the "lead" being the horizontal distance of the centre of gravity of the spoil bank from the centre of gravity of the half channel.

The rates used in the estimate are higher than those given in the table; a margin being allowed for difficulties arising from the nature of the soil, &c. In the deep cutting this is considerable, being about  $1\frac{1}{2}$  Rs.; for the rest it is  $\frac{1}{2}$  a Rupee. The rates are taken at 4 Rs.,  $2\frac{1}{2}$  Rs. and 2 Rs., as divided off by lines in the Table. The rate on the upper part of the Sasseram Branch, however, is taken at 3 Rs. per 1,000.

By Conlomb's experiments the labour expended by a man in digging the ground, in raising a maximum weight 10 feet, and in carrying it 100 feet, are nearly as  $8\frac{1}{2}$ ,  $9\frac{1}{2}$  and  $17\frac{1}{2}$  respectively. The cost is inversely as these numbers. The prices inserted in the headings of the columns are taken from Lieut. Col. A. G. Goodwyn's Gauges Canal rates, with the modifications necessary to suit this form of table. His rates so modified agree very well with the rates deduced from Coulomb's experiments. I have taken the dressing as digging to a depth of 6 inches, including the berms.

TABLE.

| Sections of Plate XXI.     | Excavation at the rate per 1,000 feet. | Lift at per 10 feet annas 12 per 1,000 feet. |        | Lead at per 100 feet annas 6½ per 1,000 cubic feet. |        | Dressing at per 1,020 supl. feet anns. 6½ equal 6 inches digging. |        | Total cost per 1,000 cubic feet. |
|----------------------------|----------------------------------------|----------------------------------------------|--------|-----------------------------------------------------|--------|-------------------------------------------------------------------|--------|----------------------------------|
|                            |                                        | Height.                                      | Cost.  | Distance.                                           | Cost.  | Proportion per 1,000 cubic feet.                                  | Cost.  |                                  |
|                            | R. A.                                  |                                              | R. A.  |                                                     | R. A.  |                                                                   | R. A.  | R. A.                            |
| Deep cutting Western Canal | 0 13                                   | 14'2                                         | 1 1    | 184'5                                               | 0 12   | 200                                                               | 0 1'3  | 2 11'3                           |
| Ditto Eastern ditto        | 0 13                                   | 15'0                                         | 1 2    | 163'2                                               | 0 10'6 | 190                                                               | 0 1'23 | 2 10'85                          |
| Channel, Class I.          | 0 13                                   | 7'0                                          | 0 9'1  | 114'0                                               | 0 7'4  | 366                                                               | 0 2'4  | 1 15'9                           |
| II.                        | 0 13                                   | 7'9                                          | 0 9'5  | 87'1                                                | 0 5'7  | 374                                                               | 0 2'4  | 1 14'6                           |
| III.                       | 0 13                                   | 8'7                                          | 0 10'4 | 84'4                                                | 0 5'5  | 298                                                               | 0 1'8  | 1 14'7                           |
| IV.                        | 0 13                                   | 7'0                                          | 0 8'4  | 63'8                                                | 0 4'1  | 449                                                               | 0 2'9  | 1 12'4                           |
| V.                         | 0 13                                   | 5'3                                          | 0 6'3  | 57'2                                                | 0 3'7  | 645                                                               | 0 4'2  | 1 11'2                           |
| VI.                        | 0 13                                   | 5'0                                          | 0 6'0  | 54'5                                                | 0 3'5  | 659                                                               | 0 4'3  | 1 10'8                           |
| VII.                       | 0 13                                   | 4'1                                          | 0 4'9  | 41'3                                                | 0 2'7  | 790                                                               | 0 5'1  | 1 9'7                            |
| VIII.                      | 0 13                                   | 3'7                                          | 0 4'4  | 37'5                                                | 0 2'4  | 968                                                               | 0 6'3  | 1 9'4                            |
| IX.                        | 0 13                                   | 3'0                                          | 0 3'6  | 29'1                                                | 0 1'9  | 1,054                                                             | 0 6'8  | 1 9'3                            |
| X.                         | 0 13                                   | 2'2                                          | 0 2'4  | 24'6                                                | 0 1'6  | 1,709                                                             | 0 10'1 | 1 11'1                           |

## A. Permanent Dam.

|                                                        | No    | L                      | B               | D               | Products.  |
|--------------------------------------------------------|-------|------------------------|-----------------|-----------------|------------|
| <i>Masonry.</i>                                        |       |                        |                 |                 |            |
| Foundation Blocks 13x7x10 exterior diversion—          |       |                        |                 |                 |            |
| Double line across Soane 9600 feet .. 1,422            |       |                        |                 |                 |            |
| Single line in rear of west sluices and on flank .. 33 |       |                        |                 |                 |            |
| Ditto eastern ditto .. 23                              |       |                        |                 |                 |            |
|                                                        | 1,478 | Section<br>(13x7—10x4) |                 | 17              | 1,281,426  |
| Main wall 9600—(357+213) .. 1                          |       | 9,030                  | $\frac{6+8}{2}$ | 6               | 379,260    |
| Wing walls of Dam sluices .. 2                         |       | 43                     | 4               | $\frac{4+7}{2}$ | 1,892      |
|                                                        |       | (Mean length)          |                 |                 |            |
| Flooring western sluices .. 1                          |       | 360                    | 93              | 2               | 67,060     |
| Flooring eastern sluices .. 1                          |       | 216                    | 93              | 2               | 40,176     |
| Concrete under flooring in ditto ..                    |       | 570                    | 711             | 3               | 122,265    |
| Piers western 33, eastern 23—                          |       |                        |                 |                 |            |
| Body under road way                                    | 62    | 23                     | 3               | 7               | 27,016     |
| 1st step .. 62                                         |       |                        | 3               | 8               | 2,976      |
| 2nd " .. 62                                            |       |                        | 3               | 7               | 2,604      |
| 3rd " .. 62                                            |       |                        | 3               | 6               | 2,232      |
| 4th " .. 62                                            |       |                        | 3               | 5               | 1,860      |
| 5th " .. 62                                            |       |                        | 3               | 4               | 1,488      |
| 6th " .. 62                                            |       |                        | 3               | 3               | 1,116      |
| 7th " .. 62                                            |       |                        | 3               | 2               | 744        |
| 8th " .. 62                                            |       |                        | 3               | 1               | 372        |
| Road way western 357, eastern 213 ..                   |       | 570                    | 23              | 2               | 26,220     |
| Total Masonry ..                                       |       |                        |                 |                 | 1,961,537  |
| <i>Dry Stone-work</i>                                  |       |                        |                 |                 |            |
| Rough stone Apron of Dam proper .. 1                   |       | 9,030                  | 135             | 10              | 12,190,500 |
| Ditto western sluices ..                               |       | 357                    | 90              | 8               | 257,040    |
| Ditto eastern ditto .. 1                               |       | 213                    | 90              | 8               | 153,360    |
| Total Dry Stone-work ..                                |       |                        |                 |                 | 12,600,900 |
| <i>Iron work</i>                                       |       |                        |                 |                 |            |
| Iron work for securing road way over Dam sluices—      |       |                        |                 |                 |            |
| Under bars .. 124                                      |       | 25                     | $\frac{1}{2}$   | $\frac{1}{2}$   | 22,222     |
| Over bars including f ds .. 124                        |       | 21                     | $\frac{1}{2}$   | $\frac{1}{2}$   | 42,000     |
| Tie rods ditto .. 256                                  |       | 10                     | $0\frac{7}{8}$  | $(\frac{1}{2})$ | 7,654      |
| Nuts .. 256                                            |       | 1                      | $0\frac{7}{8}$  | $(\frac{1}{2})$ | 618        |
| Washers .. 256                                         |       | $\frac{1}{2}$          | $\frac{1}{2}$   | $\frac{1}{2}$   | 644        |
| Total cubic feet of Iron ..                            |       |                        |                 |                 | 727        |
| Or Cwt. ..                                             |       |                        |                 |                 | 3121       |

| Masonry.                                                                   | No. | L.             | B.                        | D.       | Products. |
|----------------------------------------------------------------------------|-----|----------------|---------------------------|----------|-----------|
| <i>Earth-work.</i>                                                         |     |                |                           |          |           |
| Excavation at head in excess of which is provided for in Channel Estimate. |     |                |                           |          |           |
| First ... ..                                                               | 1   | 142            | 188                       | 17       | 333,132   |
| Second ... ..                                                              | 1   | 140            | $\frac{138}{2}$           | 17       | 164,220   |
| Embankments along Soane bank...                                            | 1   | 5,000          | $\frac{33\cdot5}{2}$      | 10       | 1,675,000 |
| Excavation for Roadway ... ..                                              | 1   | 240            | mean 30                   | 5        | 36,000    |
| Total Earth Work...                                                        | ..  | ...            | ...                       | ...      | 2,208,352 |
| <i>Dry Stone Protective Works.</i>                                         |     |                |                           |          |           |
| Along river bank ... ..                                                    | 1   | 5,000          | 5                         | 30       | 750,000   |
| Flooring inside bridge ... ..                                              | 1   | mean 160       | 94                        | 5        | 75,200    |
| Inside lower part of roadway slopes ... ..                                 | 2   | 100            | 3                         | 10       | 6,000     |
| Total Dry Stone Work ...                                                   | ... | ...            | ...                       | ...      | 831,200   |
| <i>Concrete.</i>                                                           |     |                |                           |          |           |
| Flooring under Bridge ... ..                                               | 1   | 202            | 40                        | 3        | 24,240    |
| Do. in part of Bridge ... ..                                               | 1   | 210            | 22                        | 3        | 13,860    |
| Do. near curved steps ... ..                                               | 2   | $22 \times 22$ | $(1-0\cdot78\frac{1}{2})$ | 3        | 306       |
| Do. in rear of Bridge ... ..                                               | 1   | 210            | 78                        | 3        | 49,140    |
|                                                                            |     | ...            | ..                        | ...      | 87,546    |
| Deduct Space occupied by Blocks—                                           |     |                |                           |          |           |
| First ... ..                                                               | 8   | 15             | 7                         | 3        | 2,520     |
| Second .. ..                                                               | 12  | 9\cdot5        | 7                         | 3        | 2,394     |
| Third ... ..                                                               | 2   | 11             | 7                         | 3        | 462       |
| Fourth ... ..                                                              | 77  | 13             | 7                         | 3        | 21,021    |
|                                                                            |     |                |                           |          | 26,397    |
| Total Concrete Work..                                                      | ... | ...            | ...                       | ...      | 61,149    |
| <i>Sluice Gates.</i>                                                       |     |                |                           |          |           |
| Side gates, large ... ..                                                   | 2   | 26             | 19                        | 0\cdot75 | 741       |
| Sluice gates, small .. ..                                                  | 23  | 8              | 2\cdot5                   | 0\cdot17 | 95        |
| Total ... ..                                                               | ... | ...            | ...                       | ...      | 836       |
| [Rate to cover cost of apparatus.]                                         |     |                |                           |          |           |

| Masonry                                                | No. | L.                | B. | D.  | Total. |
|--------------------------------------------------------|-----|-------------------|----|-----|--------|
| <i>Metalling</i>                                       |     |                   |    |     |        |
| Whole length of work                                   | 1   | 699               | 30 | 0.5 | 10 335 |
| Leadway to river                                       | 1   | 500               | 16 | 0.5 | 4 000  |
|                                                        | -   |                   |    |     | 14 335 |
| <i>Cut-stone work</i>                                  |     |                   |    |     |        |
| Grooves for slide gates                                | 4   | 20                | 1  | 1   | 101    |
| Heals of sluice piers with grooves                     | 21  | 15                | 2  | 2   | 1 700  |
| Coping of all parapets say<br>(see length of parapets) | 1   | 1 031             | 2  | 0.5 | 1 031  |
| String course of ditto                                 |     | 1 031             | 1  | 0.5 | 516    |
| String course of bridge piers and<br>abutment          | 10  | 60                | 1  | 0.5 | 400    |
| Outer face of arches                                   | 18  | 10 x 3 11 + 2 x 2 | 2  | 2   | 2,118  |
| Total cut-stone work                                   |     |                   |    |     | 6 159  |
| (The steps are merely of<br>concrete not cut-stone)    |     |                   |    |     |        |

## ABSTRACT

|                                                                        | Ru.    |
|------------------------------------------------------------------------|--------|
| 2 208 352 Earth work at Rs. 6 per 1 000                                | 13 250 |
| 360 193 Masonry at Rs. 15 per 100                                      | 55 151 |
| 20 508 Arching at Rs. 27 per ditto                                     | 5 517  |
| 148 Curbs for blocks at Rs. 25 each                                    | 3 700  |
| 119 Sinking blocks at Rs. 100 each                                     | 11 900 |
| 831 170 Dry stone work at Rs. 4 per 100                                | 33 268 |
| 61 149 Concrete work at Rs. 12 per 100                                 | 7 337  |
| 5 459 Cut stone work (extra charge) Rs. 30 per 100                     | 1 638  |
| 14 335 Metalling at Rs. 6 per 100                                      | 860    |
| 830 Cubic feet sluice gate apparatus included, at Rs. 5 per cubic foot | 4 150  |
| Contingencies at 5 per cent.                                           | 6 909  |

Total cost of Head Works, Western Soane Canal Co. at Rs. ... 1 47 316

N.B.—Of this sum the following is for protective works along the Soane bank for one mile viz:—

|                                          | Ru.    |
|------------------------------------------|--------|
| 1 575 000 Cubic feet embankment at Rs. 6 | 10 050 |
| 750 000 Ditto dry stone work at Rs. 4    | 3 000  |
| Contingencies                            | 2 000  |

In all Rs. ... 45 000

## No. 3, Head Works.—B. Eastern Soane Canal.

|                                                                                          | No. | L.                  | B.         | D.    | Total.   |
|------------------------------------------------------------------------------------------|-----|---------------------|------------|-------|----------|
| <i>Main Bridge.</i>                                                                      |     |                     |            |       |          |
| Flooring under bridge, including piers but not abutments, nor the starlings of piers ... | 1   | 156                 | 40         | 2     | 12,480   |
| Ditto in front of bridge, including starlings ...                                        | 1   | 164                 | 22         | 2     | 7,216    |
| Ditto ditto portions next to curve of steps ...                                          | 2   | 22 × 22             | (1-0·7854) | 2     | 315      |
| Ditto in rear of bridge, including starlings ...                                         | 1   | 164                 | 78         | 2     | 25,584   |
| Piers and abutments between starlings up to spring of arch...                            | 8   | 35                  | 5·         | 12·5  | 17,500   |
| Starlings up to ditto ...                                                                | 16  | 2·5 × 2·5           | 0·78 × 2   | 12·5  | 1,950    |
| Abutments backing of centre wall river side ...                                          | 2   | 19·5                | 3          | 23·5  | 2,749    |
| Ditto in rear of ditto ...                                                               | 2   | 13                  | 1          | 12    | 312      |
| Ditto ...                                                                                | 2   | 13·5                | 1          | 9     | 243      |
| Ditto ...                                                                                | 2   | 14                  | 1          | 6     | 168      |
| Abutments, straight wings or buttresses ...                                              | 4   | 9                   | 6          | 23·5  | 5,076    |
| Ditto ditto ...                                                                          | 4   | 3                   | 4          | 23·5  | 1,128    |
| Ditto ditto ...                                                                          | 4   | 5                   | 4          | 18·5  | 1,480    |
| Ditto ditto ...                                                                          | 4   | 6                   | 3          | 13·5  | 972      |
| Curved wings ...                                                                         | 2   | 16                  | 3          | 23·5  | 2,256    |
| Ditto ...                                                                                | 2   | 8                   | 3          | 15·5  | 744      |
| Ditto ...                                                                                | 2   | 7                   | 3          | 11    | 462      |
| Ditto ...                                                                                | 2   | 3·5                 | 2          | 11    | 154      |
| Ditto Pillar ...                                                                         | 2   | 2·5                 | 2·5        | 11    | 137      |
| Sluice piers ...                                                                         | 15  | 12·5                | 2          | 6·5   | 2,437    |
| Starlings to ditto ...                                                                   | 30  | 2 × 2               | ·7854 ÷ 2  | 6·5   | 306      |
| Ditto above ditto ...                                                                    | 15  | 2·5 × 2·5           | ·78 ÷ 2    | 5·5   | 201      |
| Ditto ditto to receive groove ...                                                        | 15  | 0·5                 | 2          | 5·5   | 82       |
| Sluice wall below spring of arch...                                                      | 5   | 1·8                 | 10         | 5·5   | 4,950    |
| Ditto in arches...                                                                       | 5   | 18 × 18             | ·78 ÷ 2    | 5·5   | 3,475    |
| Arches ...                                                                               | 7   | 10 × 3·14           | 355·       | 2     | 15,606   |
| Solid spandrills in front of middle wall ...                                             | 7   | 11 × 22             | (1-0·78)   | 17·5  | 6,522    |
| Portions above centre of piers ...                                                       | 6   | 1                   | 17·5       | 11    | 1,155    |
| Ditto behind abutments ...                                                               | 2   | 6                   | 17·5       | 11    | 2,310    |
| Two spandrill walls behind centre walls ...                                              | 14  | 11 × 22             | (1-·78)    | 2     | 1,490    |
| Flooring of roadway of bridge between centre walls ...                                   | 14  | mean 13             | 6          | 1·5   | 1,638    |
| Backing up behind abutments ...                                                          | 2   | 3                   | 12         | 11    | 792      |
| Over piers ...                                                                           | 6   | 7 ÷ 2               | 12         | 6·5   | 1,638    |
| Parapet of curved wing walls ...                                                         | 2   | 3·14 ÷ 3 × 18 × 1·5 |            | 4     | 299      |
| Centre wall of bridge ...                                                                | 1   | 219                 | 2          | 4     | 1,752    |
| Terminal blocks of ditto ...                                                             | 2   | 3 ÷ 3 × 0·78 + 2    |            | 4     | 28       |
| Front parapets of bridge ...                                                             | 1   | 219                 | 1·5        | 4     | 1,314    |
| Terminal blocks of ditto ...                                                             | 2   | 2                   | 2          | 4     | 32       |
| Rear parapet of bridge ...                                                               | 1   | 166                 | 1·5        | 4     | 996      |
| . Carried over ...                                                                       | ... | ...                 | .....      | ..... | 1,27,939 |

|                                                                                  | No | I                          | B                              | D             | Total    |
|----------------------------------------------------------------------------------|----|----------------------------|--------------------------------|---------------|----------|
| Prognath forward<br>Extra quantity for taking parapet<br>round startings         | 16 | $(314+2-1) \times 35$      |                                | $15 \times 4$ | 1,273.99 |
| <i>Small Bridge over Roadway</i>                                                 |    |                            |                                |               | 191      |
| Abutment first                                                                   | 10 | 19                         | 11                             | 8             | 3,341    |
| second                                                                           | 10 | 19                         | 10                             | 8             | 1,900    |
| third                                                                            | 10 | 19                         | 8                              | 6             | 1,871    |
| fourth                                                                           | 10 | 19                         | 6                              | 2             | 400      |
| fifth                                                                            | 10 | 19                         | 5.5                            | 1             | 200      |
| Ditto backing up belnd arch                                                      | 10 | 19                         | 5                              | 4             | 700      |
| Arch                                                                             | 1  | 200                        | 195                            | 2             | 601      |
| Spander solid                                                                    | 1  | $(1 \times 18.5)$          | $(1-0.5) \times 19$            |               | 313      |
| Rear wing walls                                                                  | 10 | 10                         |                                | 18            | 700      |
| Ditto ditto                                                                      | 10 | 10                         |                                | 11            | 600      |
| Startings in rear                                                                | 10 | $3 \times 3 \times 0.8+2$  |                                | 16            | 112      |
| Parapets to bridge and wing walls<br>in rear.—Over bridge                        | 1  | 18                         | 15                             | 4             | 109      |
| Over wing walls                                                                  | 10 | $16 \times 31+3$           | 15                             | 4             | 301      |
| Over startings                                                                   | 10 | $2 \times 2 \times 0.8+2$  |                                | 1             | 10       |
| Dwarf pillars                                                                    | 10 | 2                          | 2                              | 4             | 32       |
| Steps in rear of bridge including<br>foundation of rear wing wall—               |    |                            |                                |               |          |
| Three lowest steps                                                               | 10 | 39                         | 3                              | 5             | 1,140    |
| Three next                                                                       | 10 | 39                         | 3                              | 4             | 910      |
| Four next                                                                        | 10 | 30                         | 4                              | 4             | 1,000    |
| Four next                                                                        | 10 | 27                         | $(1 \times 4) - (2 \times 2)$  |               | 700      |
| Top walls                                                                        | 10 | 18                         | 2                              | 11            | 700      |
| Parapet                                                                          | 10 | 30                         | 15                             | 3             | 700      |
| <i>Steps in rear of Main Bridge</i>                                              |    |                            |                                |               |          |
| Lower steps and covering over<br>walls                                           | 10 | 80                         | 7                              | 3             | 3,360    |
| High steps above the lowest                                                      | 10 | 80                         | 6                              | 35            | 3,360    |
| Two next                                                                         | 10 | 77                         | 12                             | 50            | 1,711    |
| Two next                                                                         | 10 | 75                         | 12                             | 40            | 1,300    |
| Three next                                                                       | 10 | 72                         | 7                              | 4             | 1,000    |
| Three next                                                                       | 10 | 72                         | 3                              | 4             | 1,000    |
| Three next                                                                       | 10 | 61                         | 35                             | 35            | 1,411    |
| Three next                                                                       | 10 | 63                         | 3                              | 4             | 1,000    |
| Top steps and walls                                                              | 10 | 41                         | $(7 \times 11) - (2 \times 2)$ |               | 2,500    |
| Parapets belnd steps                                                             | 10 | $17 \times 31+3 \times 15$ |                                | 3             | 1        |
| Dwarf pillars at ends                                                            | 4  | 2                          | 2                              | 3             | 40       |
| <b>Total Masonry</b>                                                             |    |                            |                                |               | 1,63,400 |
| <i>Earth-work</i>                                                                |    |                            |                                |               |          |
| Excavation at level in excess of<br>what is provided for in Class<br>of masonry— |    |                            |                                |               |          |
| first                                                                            | 1  | 140                        | 70                             | 17            | 1,710    |
| second                                                                           | 1  | 140                        | 70                             | 17            | 1,710    |
| Excavation for Roadway                                                           | 1  | 210                        | 70                             | 5             | 2,000    |
| <b>Total Earth-work</b>                                                          |    |                            |                                |               | 1,30,000 |

|                                                    | No. | L.   | R.  | D.  | Total.   |
|----------------------------------------------------|-----|------|-----|-----|----------|
| Brought forward ...                                | ... | ...  | ... | ... | 4,137    |
| String course of bridge piers and abutments ... .. | 16  | 40   | 1   | 0·5 | 320      |
| Outer faces of arches ... ..                       | 21  | 31½  | 2   | 2   | 3,024    |
| Total ...                                          | ... | ...  | ..  | ... | 7,481    |
| <i>Excavation.</i>                                 |     |      |     |     |          |
| Say ... ..                                         | 1   | 250  | 100 | 23  | 5,75,000 |
| And ... ..                                         | 1   | 200  | 50  | 18  | 1,80,000 |
| Total Excavation ...                               | ... | ...  | ... | ... | 7,55,000 |
| <i>Metalling.</i>                                  |     |      |     |     |          |
| 1st Bridge... ..                                   | 1   | 101  | 16  | 0·5 | 832      |
| 2nd " ... ..                                       | 1   | 180  | 16  | 0·5 | 1,410    |
| Sides of lock chambers ... ..                      | 2   | 150  | 32  | 0·5 | 4,800    |
| Total ...                                          | ... | ...  | ... | ... | 7,072    |
| <i>Gates.</i>                                      |     |      |     |     |          |
| Lock gates, 4 pairs, or ... ..                     | 8   | 0·75 | 10  | 26  | 1,560    |
| Sluice gates ... ..                                | 20  | 0·17 | 2·5 | 8   | 68       |
| Total ...                                          | ... | ...  | ... | ... | 1,628    |
| Drum sluices ... ..                                | 10  |      |     |     |          |

## ABSTRACT.

|                                                   |                                                     |     |     |     |     | Rs.      |
|---------------------------------------------------|-----------------------------------------------------|-----|-----|-----|-----|----------|
| 7,55,000                                          | Excavation, at Rs. 6 per 1,000                      | ... | ... | ... | ... | 4,530    |
| 199                                               | Curb frames for blocks, at Rs. 25 each              | ... | ... | ... | ... | 4,975    |
| 4,95,992                                          | Cubic feet masonry, at Rs. 15 per 100               | ... | ... | ... | ... | 74,399   |
| 199                                               | Blocks, sinking, at Rs. 100 each                    | ... | ... | ... | ... | 19,900   |
| 12,830                                            | Of arch work, at Rs. 25                             | ... | ... | ... | ... | 3,207    |
| 61,783                                            | Concrete work, at Rs. 12                            | ... | ..  | ..  | ... | 7,774    |
| 24,300                                            | Dry stone-work, at Rs. 4                            | ... | ... | ... | ... | 972      |
| 7,481                                             | Cut stone-work (extra charge), at Rs. 30            | ... | ... | ... | ... | 2,214    |
| 7,072                                             | Metalling, at Rs. 6                                 | ... | ... | ... | ... | 424      |
| 1,628                                             | Cubic feet gates, with apparatus, at Rs. 5 per foot | ... | ... | ... | ... | 8,140    |
| 10                                                | Drum sluices, at Rs. 100 each                       | ... | ... | ... | ... | 1,000    |
|                                                   | Contingencies at 5 per cent.                        | ... | ... | ... | ..  | 6,378    |
| Total cost of Western Lock Channel Head, Co.'s Rs |                                                     |     |     |     |     | 1,33,943 |

*B Eastern Lock Channel Head.*

|                                                                                            | No | L                                                                                           | B               | D   | Total    |
|--------------------------------------------------------------------------------------------|----|---------------------------------------------------------------------------------------------|-----------------|-----|----------|
| Flooring all under body of works<br>Ditto behind abutments, beyond<br>line of counterforts | 1  | 210                                                                                         | 116             | 2   | 61,320   |
| Lock chamber walls                                                                         | 4  | 11 × 7<br>153                                                                               | 7<br>10         | 2   | 501      |
| Semi-circular ends                                                                         | 4  | $10^2 \times 7 \div 51$<br>2                                                                |                 | 215 | 1,19,910 |
| Centre projections                                                                         | 2  | 10                                                                                          | 0               | 215 | 3,845    |
|                                                                                            |    |                                                                                             |                 |     | 7,056    |
| Deduct—Hollows for lock gates                                                              | 8  | 12                                                                                          | 1               | 215 | 2,352    |
| Ditto in centre walls                                                                      | 2  | (153—20)                                                                                    | 3               | 4   | 3,112    |
| Above footing outer wall                                                                   | 2  | 123                                                                                         | 2               | 0   | 4,128    |
| Backing behind arch                                                                        | 2  | 10                                                                                          | $\frac{2+6}{2}$ | 0   | 912      |
| Do.                                                                                        | 2  | 10                                                                                          | 10              | 3   | 1,140    |
| Part of arch                                                                               | 2  | 10                                                                                          | 1               | 2   | 260      |
|                                                                                            |    |                                                                                             |                 |     | 12,500   |
| Counterforts                                                                               | 10 | 0                                                                                           | 4               | 215 | 2,10,375 |
| Buttresses at flanks                                                                       | 4  | 12                                                                                          | $\frac{8+4}{2}$ | 215 | 5,880    |
| Front wing walls, 1st                                                                      | 2  | 0                                                                                           | 8               | 215 | 372      |
| 2nd                                                                                        | 2  | 7                                                                                           | 0               | 215 | 2,038    |
| 3rd                                                                                        | 2  | 11                                                                                          | 4               | 12  | 1,065    |
| Rear wing walls curved, 1st                                                                | 2  | $53 \times 3 \div 116$<br>12                                                                | 0               | 215 | 4,070    |
| 2nd                                                                                        | 2  | $51 \times 3 \div 116$<br>12                                                                | 4               | 17  | 1,810    |
| 3rd                                                                                        | 2  | $40 \times 3 \div 116$<br>12                                                                | 2               | 10  | 515      |
| Below pillar                                                                               | 4  | 3                                                                                           | 3               | 10  | 304      |
| Sluice wall, 1st                                                                           | 1  | 52                                                                                          | 0               | 11  | 3,718    |
| 2nd                                                                                        | 1  | 52                                                                                          | 10              | 0   | 3,128    |
| 3rd                                                                                        | 2  | 6                                                                                           | 12              | 8   | 1,624    |
| 4th                                                                                        | 0  | 2                                                                                           | 12              | 8   | 1,728    |
| Piers of head bridge, 1st                                                                  | 2  | 23—12                                                                                       | 6               | 8   | 5,472    |
| 2nd                                                                                        | 2  | 23—10                                                                                       | 6               | 0   | 744      |
| Starlings                                                                                  | 4  | $5^2 \times 7 \div 51$<br>2                                                                 |                 | 215 | 955      |
| Heads sluice piers                                                                         | 0  | $2^2 \times 7 \div 51$<br>2                                                                 |                 | 13  | 183      |
| Ditto spaces for grooves                                                                   | 0  | 4                                                                                           | 1               | 13  | 263      |
| Arch ing head bridge                                                                       | 3  | $20 \times 3 \div 116$<br>2                                                                 | 15              | 2   | 2,805    |
| Spandrills, head bridge                                                                    |    | $(61 \times 15 \times 11) - (3 \times 22^2 \times \frac{0^2 \div 51}{2} \times 15) = 2,000$ |                 |     |          |
| Tail bridge, piers                                                                         | 2  | 10                                                                                          | 5               | 12  | 2,200    |
| Starlings                                                                                  | 4  | $5^2 \times 7 \div 51$<br>2                                                                 |                 | 215 | 955      |
| Carried over                                                                               | —  | —                                                                                           | —               | —   | 2,57,571 |





*B. Eastern Lock Channel Head.*

|                                                         | No. | L.                                                                                     | B.              | D.   | Total.          |
|---------------------------------------------------------|-----|----------------------------------------------------------------------------------------|-----------------|------|-----------------|
| Flooring all under body of works                        | 1   | 210                                                                                    | 116             | 2    | 61,320          |
| Ditto behind abutments, beyond line of counterforts ... | 2   | 11 × 7                                                                                 | 7               | 2    | 501             |
| Lock chamber walls ...                                  | 4   | 153                                                                                    | 10              | 21.5 | 1,19,910        |
| Semi-circular ends ...                                  | 4   | $10^2 \times 7854$                                                                     |                 | 21.5 | 3,818           |
| Centre projections ...                                  | 2   | 16                                                                                     | 9               | 21.5 | 7,056           |
|                                                         |     |                                                                                        |                 |      | <u>2,22,668</u> |
| Deduct—Hollows for lock gates                           | 8   | 12                                                                                     | 1               | 21.5 | 2,352           |
| Ditto in centre walls ...                               | 2   | (153-20)                                                                               | 3               | 4    | 3,192           |
| Above footing outer wall                                | 2   | 123                                                                                    | 2               | 9    | 4,128           |
| Backing behind arch ...                                 | 2   | 19                                                                                     | $\frac{2+6}{2}$ | 6    | 912             |
| Do, ...                                                 | 2   | 19                                                                                     | 10              | 3    | 1,140           |
| Part of arch ...                                        | 2   | 19                                                                                     | 4               | 2    | 206             |
|                                                         |     |                                                                                        |                 |      | <u>12,270</u>   |
|                                                         |     |                                                                                        |                 |      | 2,10,378        |
| Counterforts ...                                        | 10  | 9                                                                                      | 4               | 21.5 | 5,880           |
| Buttresses at flanks ...                                | 4   | 12                                                                                     | $\frac{8+4}{2}$ | 21.5 | 7,056           |
| Front wing walls, 1st ...                               | 2   | 9                                                                                      | 8               | 21.5 | 3,724           |
| 2nd ...                                                 | 2   | 7                                                                                      | 6               | 21.5 | 2,034           |
| 3rd ...                                                 | 2   | 11                                                                                     | 4               | 12   | 1,006           |
| Rear wing walls curved, 1st ...                         | 2   | $53 \times 31416$                                                                      | 9               | 21.5 | 4,074           |
| 2nd ...                                                 | 2   | $51 \times 31416$                                                                      | 4               | 17   | 1,916           |
| 3rd ...                                                 | 2   | $49 \times 31416$                                                                      | 2               | 10   | 512             |
| Below pillar                                            | 4   | 3                                                                                      | 3               | 10   | 300             |
| Stair wall, 1st ...                                     | 1   | 62                                                                                     | 6               | 11   | 3,214           |
| 2nd ...                                                 | 1   | 62                                                                                     | 10              | 6    | 3,124           |
| 3rd ...                                                 | 2   | 8                                                                                      | 12              | 8    | 1,600           |
| 4th ...                                                 | 9   | 2                                                                                      | 12              | 8    | 1,728           |
| Piers of head bridge, 1st ...                           | 2   | 23-12                                                                                  | 5               | 8    | 824             |
| 2nd ...                                                 | 2   | 23-10                                                                                  | 5               | 0    | 724             |
| Starlings ...                                           | 4   | $5^2 \times 7854$                                                                      |                 | 21.5 | 832             |
| Heads sluice piers ...                                  | 9   | $2^2 \times 7854$                                                                      |                 | 13   | 188             |
| Ditto spaces for grooves ...                            | 9   | 4                                                                                      | 4               | 13   | 522             |
| Arching head bridge ...                                 | 3   | $20 \times 31416$                                                                      | 15              | 2    | 2,922           |
| Spandrills, head bridge ...                             |     | $(61 \times 15 \times 11) - (3 \times 22^2 \times \frac{0.7854}{2} \times 15) = 2,000$ |                 |      |                 |
| Tail bridge, piers ...                                  | 2   | 19                                                                                     | 5               | 12   | 2,200           |
| Starlings ...                                           | 4   | $8^2 \times 7854$                                                                      |                 | 21.5 | 1,022           |
| Carried over ...                                        |     |                                                                                        |                 |      | 2,27,574        |

|                                                               | No. | B.                                                     | D.                    | L.                   | Total.   |
|---------------------------------------------------------------|-----|--------------------------------------------------------|-----------------------|----------------------|----------|
| Brought forward ...                                           | ... | .....                                                  | .....                 | .....                | 2,57,574 |
| Arching ... ..                                                | 3   | $20 \times 3 \cdot 1416$                               | 19                    | 2                    | 3,572    |
| Backing behind arches                                         | 2   | $\frac{2}{2}$                                          | 7                     | 15                   | 462      |
| Spandrill walls ... ..                                        | 4   | $(11 \times 64 - 3 \times 22^2 \times \frac{7854}{2})$ |                       | 2                    | 1,072    |
| Arching of side arches ... ..                                 | 2   | $18 \times 3 \cdot 14$                                 | $0 \cdot 5 \times 19$ | 2                    | 2,149    |
| Spandrills of ditto ... ..                                    | 2   | 10                                                     | $9 \times 0 \cdot 5$  | 19                   | 720      |
| Steps in rear of Bridge, 1st & 2nd                            | 2   | 60                                                     | $3 \frac{1}{2}$       | 3                    | 1,260    |
| Next 3 ... ..                                                 | 2   | 59                                                     | $6 + 4$               | $0 \cdot 5 \times 3$ | 1,770    |
| " 3 ... ..                                                    | 2   | 58                                                     | $6 + 4$               | $0 \cdot 5 \times 3$ | 1,740    |
| " 3 ... ..                                                    | 2   | 56                                                     | $6 + 4$               | $0 \cdot 5 \times 3$ | 1,680    |
| " 3 ... ..                                                    | 2   | 53                                                     | $6 + 4$               | $0 \cdot 5 \times 3$ | 1,609    |
| " 3 ... ..                                                    | 2   | 48                                                     | $7 + 5$               | $0 \cdot 5 \times 3$ | 1,728    |
| " 3 ... ..                                                    | 2   | 41                                                     | $4 + 2$               | $0 \cdot 5 \times 3$ | 738      |
| Remainder ... ..                                              | 2   | 32                                                     | $5 + 2$               | $0 \cdot 5 \times 3$ | 672      |
| Wall under top                                                | 2   | 28                                                     | 3                     | $1 \frac{1}{2}$      | 252      |
| Do. ... ..                                                    | 2   | 28                                                     | 2                     | $3 \frac{1}{2}$      | 392      |
| Parapets of curved wings ...                                  | 4   | $24 \times 3 \cdot 14$                                 | 3                     | $1 \frac{1}{2}$      | 678      |
| Heads of Lock walls ... ..                                    | 8   | $\frac{2}{3 \cdot 1416 \times 8 \frac{1}{2} \times 3}$ |                       | $1 \frac{1}{2}$      | 836      |
| Ditto Piers ... ..                                            | 16  | $\frac{2}{3 \cdot 1416 \times 4 \times 3}$             |                       | $1 \frac{1}{2}$      | 452      |
| Crossing lock channel ... ..                                  | 4   | 16                                                     | 3                     | $1 \frac{1}{2}$      | 288      |
| Crossing arches ... ..                                        | 12  | 18                                                     | 3                     | $1 \frac{1}{2}$      | 972      |
| Sides of lock chamber ... ..                                  | 4   | 132                                                    | 3                     | $1 \frac{1}{2}$      | 2,376    |
| Sides of bason, front of bridge ...                           | 2   | 12                                                     | 3                     | $1 \frac{1}{2}$      | 108      |
| Rear of bridge, round curve ...                               | 2   | 106                                                    | 3                     | $1 \frac{1}{2}$      | 954      |
| Front ... ..                                                  | 2   | 22                                                     | 3                     | $1 \frac{1}{2}$      | 198      |
| Dwarf pillars ... ..                                          | 8   | 2                                                      | 2                     | 3                    | 96       |
| Total Masonry ... ..                                          | ... | ...                                                    | ...                   | ...                  | 2,85,964 |
| <i>Excavation.</i>                                            |     |                                                        |                       |                      |          |
| First ... ..                                                  | 1   | 250                                                    | 75                    | 21·5                 | 403,125  |
| Second ... ..                                                 | 1   | 200                                                    | 25                    | 16·5                 | 82,500   |
| Total ... ..                                                  | ... | ...                                                    | ...                   | ...                  | 485,625  |
| <i>Cut Stone-work.</i>                                        |     |                                                        |                       |                      |          |
| Seat for lock gates ... ..                                    | 8   | 24·5                                                   | 2                     | 2                    | 784      |
| Heads of sluice pier ... ..                                   | 9   | 13                                                     | 2                     | 2                    | 468      |
| Coping of all parapets, see length of parapets in masonry ... | 1   | 1,160                                                  | 2                     | 0·5                  | 1,160    |
| String course of ditto ... ..                                 | 1   | 1,160                                                  | 1                     | 0·5                  | 580      |
| String course of bridge piers and abutments ... ..            | 6   | 40                                                     | 1                     | 0·5                  | 120      |
| Outer faces of arches ... ..                                  | 16  | 31·5                                                   | 2                     | 2                    | 2,016    |
| Total Cut Stone-work ... ..                                   | ... | ...                                                    | ..                    | ...                  | 5,128    |

|                        | No | B    | D   | L   | Total |
|------------------------|----|------|-----|-----|-------|
| <i>Metalling</i>       |    |      |     |     |       |
| 1st Bridge             | 1  | 58   | 16  | 0.5 | 471   |
| 2 1 do.                | 1  | 13   | 10  | 0.5 | 101   |
| Sides of lock chambers | 2  | 150  | 32  | 0.5 | 4,800 |
| Total                  |    |      |     |     | 5,369 |
| <i>Gates</i>           |    |      |     |     |       |
| Lock gates..           | 8  | 0.75 | 10  | 26  | 1 500 |
| Sluice gates           | 12 | 0.17 | 2.5 | 8   | 41    |
| Total ..               |    |      |     |     | 1 601 |

## ABSTRACT

|                                                     | Ra.        |
|-----------------------------------------------------|------------|
| 453 6 <sup>25</sup> Excavation at Rs 6 per 1 000 .. | 2 913      |
| 2 <sup>58</sup> 000 Masonry at Rs. 15 per 100       | 41,370     |
| 8 518 Arcling at 1 s. 25                            | 2 139      |
| 6 128 Cut stone-work extra charge Rs 30             | 1,538      |
| 6,369 Metalling at Rs 6                             | 322        |
| 1 601 Gates including apparatus at Rs. 6            | 8 000      |
| 10 Drum sluices, at Rs. 100                         | 1 000      |
| Contingencies at 5 per cent. ..                     | 2 951      |
| Total cost of Eastern Lock Channel Head             | Ra. 60 151 |

## No. 5, Tootla Syphons.

|                                                                      | No. | L.              | B.                | D.            | Total.   |
|----------------------------------------------------------------------|-----|-----------------|-------------------|---------------|----------|
| <i>Excavation</i> ... ..                                             | 1   | 182             | 107               | 24            | 4,67,376 |
| <i>Masonry.</i>                                                      |     |                 |                   |               |          |
| Foundation blocks, 1st ... ..                                        | 50  | (13 × 7—10 × 4) |                   | 12            | 30,600   |
| 2nd ... ..                                                           | 8   | 14 × 7—11 × 4   |                   | 12            | 5,184    |
| 3rd ... ..                                                           | 4   | 15 × 7—12 × 4   |                   | 12            | 2,736    |
| 4th ... ..                                                           | 8   | 9½ × 9—6 × 6½   |                   | 12            | 4,464    |
| Flooring—Body of the work under all, over blocks... ..               | 1   | 138             | 108               | 2             | 29,808   |
| Over outer blocks, up and down stream ...                            | 2   | 108             | 7                 | 2             | 3,024    |
| Over wing blocks ...                                                 | 4   | 31·5            | 17 + 7            | 2             | 3,024    |
| Steps and supporting walls—Whole blocks, triangular over floor level | 2   | 106             | 26 × 0·5          | 13·5          | 37,106   |
| Add half back walls ...                                              | 2   | 106             | 2                 | 13·5          | 5,724    |
| Total ...                                                            | ... | .....           | .....             | .....         | 1,21,670 |
| <i>Deduct</i> triangular prism between side walls                    | 2   | 98              | 16·5 × 0·5        | 6·5           | 10,510   |
| Also reduced thickness of wing wall, say ... ..                      | 4   | 12              | 1                 | 13·5          | 648      |
| (Leaving segment of arch to cover cost of turning.)                  |     |                 |                   |               |          |
| Total Deductions ...                                                 | ... | .....           | .....             | .....         | 11,158   |
|                                                                      |     |                 |                   |               | 1,10,512 |
| Abutment walls of aqueduct ...                                       | 2   | 123             | 5                 | 5             | 6,150    |
| Piers of aqueduct ... ..                                             | 9   | 123             | 4                 | 5             | 22,140   |
| Starlings to do. ... ..                                              | 18  | 4 × 4           | 0·78 × 0·5        | 5             | 565      |
| Abutment walls of road bridge ...                                    | 4   | 15              | 4·5               | 8             | 2,160    |
| Do. behind spandrills                                                | 4   | 15              | 1·5               | 5             | 450      |
| Piers of road bridge ... ..                                          | 18  | 15              | 3                 | 8             | 6,480    |
| Starlings to do. ... ..                                              | 18  | 3 × 3           | 0·78 × 0·5        | 8             | 509      |
| Caps to do. ... ..                                                   | 18  | 3 × 3           | 7854<br>2         | 0·16 × 1      | 21       |
| Wing walls above steps ... ..                                        | 4   | 28              | 4·5               | (18 + 11) 0·5 | 7,308    |
| Do. curved portion above steps                                       | 4   | 8               | 3                 | (11 + 7) 0·5  | 864      |
| Do. upper parts ... ..                                               | 4   | 22              | 3                 | 8             | 2,208    |
| Aqueduct floor ... ..                                                | 1   | 106             | 92                | 3             | 29,256   |
| Walls, straight part                                                 | 2   | 106             | 4                 | 10            | 8,480    |
| Splays ... ..                                                        | 4   | 25              | 12 × 0·33         | 12            | 4,800    |
| Steps beyond ... ..                                                  | 4   | 13·5            | (17 + 11·5) × 0·5 | 12            | 9,234    |
| Total ...                                                            | ... | .....           | .....             | .....         | 2,11,137 |
| <i>Deduct</i> hollow under arch taken triangular                     | 4   | 13·5            | 9 × 0·5           | 5·5           | 1,336    |
| Total ...                                                            | ... | ...             |                   | .....         | 2,09,801 |

|                                                                          | No             | L                                                        | B    | D               | Total    |
|--------------------------------------------------------------------------|----------------|----------------------------------------------------------|------|-----------------|----------|
| Brought forward                                                          |                |                                                          |      |                 | 2 07 801 |
| Arching                                                                  | 20             | $(10^2 - 7^2) \times 0.78 \times 0.25 \times 15$         |      |                 | 6,008    |
| Span brills (solid)                                                      | 20             | $(10 \times 5 - 10^2 \times 0.78 \times 0.25) \times 15$ |      |                 | 3,210    |
| Parapets—Over curves of wing walls                                       | 4              | 22                                                       | 15   | 3               | 300      |
| “ Straight part                                                          | 4              | 20                                                       | 15   | 3               | 300      |
| “ Brills                                                                 | 4              | 20                                                       | 15   | 3               | 1 780    |
| “ Curves beyond bridge                                                   | 4              | 27                                                       | 15   | 3               | 480      |
| Total Masonry                                                            |                | —                                                        |      |                 | 2 22 050 |
| Concrete under all                                                       | 1              | 121                                                      | 97   | 3               | 30 081   |
| Extra cast stone beams supporting aqueduct, and in flooring under bridge | 2              | 93                                                       | 92   | 2               | 31,221   |
| Iron Work*                                                               |                |                                                          |      |                 |          |
| Longitudinal pieces                                                      | 40             | 81                                                       | 0.17 | 0.01            | 23.33    |
| Vertical do                                                              | $10 \times 90$ | 0.5                                                      | 0.78 | $0.0 \times 10$ | 20.0     |
| Nuts                                                                     | $10 \times 90$ | 0.01                                                     | 0.04 | 0.08            | 0.2      |
| Total                                                                    |                |                                                          |      |                 | 60.20    |
| Metalling over roadways                                                  | 2              | 175                                                      | 10   | 0.5             | 2 800    |
| Dry Stone work                                                           | 1              | 100                                                      | 25   | $3 \times 0.5$  | 9 000    |
|                                                                          | 1              | 100                                                      | 12   | $3 \times 0.5$  | 10 400   |
| Total                                                                    |                |                                                          |      |                 | 10 800   |
| Extra cost of Cut Stone-work                                             |                |                                                          |      |                 |          |
| Casing of parapets                                                       |                | 801                                                      | 2    | 0.5             | 801      |
| String course—Outside bridge parapets                                    | 2              | 90                                                       | 1    | 0.5             | 10       |
| Tops of piers and abutments                                              | 19             | 315                                                      | 1    | 0.5             | 310.5    |
| Wing walls                                                               | 4              | 35                                                       | 1    | 0.5             | 70       |
| Total                                                                    |                |                                                          |      |                 | 1 227.5  |

\* The greatest pressure on the top of the openings will amount to 17 feet of water on the lower surface of the covering of the openings, that is on 1st of the flooring of the aqueduct equal to, say 12 feet on the whole floor. Of this 1 foot is more than met by the weight of the 3 feet of masonry, and, if the canal be empty at the time of the flood passing the rest must be met by iron ties, holding down the stone beams to the piers. This balance of pressure is equal in each running foot of opening to  $6 \times 9 \times 0.25 = 13.5$  lbs., and if one tie be placed on each side every ten running feet each will have to support this pressure which is 5 tons to the square inch will require a section of 0.3 of a square inch nearly. The floor (say 10" x 5") will give 0.18 of a square inch section.

## ABSTRACT.

Rs.

|         |                                                   |     |     |     |     |        |
|---------|---------------------------------------------------|-----|-----|-----|-----|--------|
| 467,376 | Cubic feet of excavation, at Rs. 6                | ... | ... | ... | ... | 2,804  |
| 216,014 | ditto of masonry, at Rs. 15                       | ... | ... | ... | ... | 32,406 |
| 70      | Sinking blocks, at Rs. 50                         | ... | ... | ... | ... | 3,500  |
| 70      | Curbs for do., at Rs. 25...                       | ... | ... | ... | ... | 1,750  |
| 36,084  | Concrete, at Rs. 12                               | ... | ... | ... | ... | 4,330  |
| 34,224  | Extra cost of stone beams, at Rs. 10 per 100      | ... | ... | ... | ... | 3,422  |
| 60.20   | Cubic feet or 258.66 cwt. iron work, at Rs. 20... | ... | ... | ... | ... | 5,173  |
| 10,800  | Ditto dry stone-work, at Rs. 6 per 100            | ... | ... | ... | ... | 648    |
| 2,800   | Ditto metalling, at Rs. 6                         | ... | ... | ... | ... | 168    |
| 1,277.5 | Cut stone-work (extra cost), at Rs. 30            | ... | ... | ... | ... | 383    |
|         | Contingencies, at 5 per cent.                     | ... | ... | ... | ... | 2,729  |

Total cost, Rs. 57,313

Or for five Syphon Drains ... .. " 2,86,565

If the soil should prove favourable, the expense may be reduced by the following items:—

|                               |     |     |                             |           |
|-------------------------------|-----|-----|-----------------------------|-----------|
| Masonry in blocks             | ... | ... | Cubic feet 42,984           |           |
| Less extra thickness of floor | ... | ... | " 14,904                    |           |
|                               |     |     | Cubic feet 28,080 at Rs. 15 | Rs. 4,212 |
| Sinking blocks...             | ... | ... | ...                         | 3,500     |
| Curbs to do.                  | ... | ... | ...                         | 1,750     |
| Concrete                      | ... | ... | ...                         | 4,330     |
| Share of contingencies        | ... | ... | ...                         | 689       |
|                               |     |     | Total...                    | 14,481    |

Making the cost for each Syphon of 10 spans 6 × 5, ... .. Rs. 42,838

Or for the five ... .. " 2,14,190

*Second Plan.*

To cross the Tootla by Inlet and Escape would require the excavation of channels to carry off the waters from the canal towards the Soane. Three of the escapes should be in the 8th mile of the canal line. The Tootla near Tilothoo is a large Nala, and becomes so about  $1\frac{1}{2}$  miles from this part of the canal line. The level of the bed of the former is 334.10 feet above the datum, and of the latter 339.75. Giving the escapes a drop of 2 feet on leaving the canal, the channel would have a fall of about  $2\frac{1}{2}$  feet in the mile, which would answer very well for an escape only occasionally carrying a large body of water. The excavation would be rather heavy. Even allowing for the partial adoption of existing Nalas, it cannot be reckoned at a less average depth than 8 feet.

The fourth escape would be at the 9th mile, where it would be necessary to excavate a channel of about 5 miles. The fifth would be near the 10th mile, when the drainage would fall into the escape channel above the first bifurcation of the canal, at the end of about  $\frac{1}{2}$  a mile.

It would be necessary therefore to provide three channels of  $\frac{1}{2}$  a mile each to carry 1,500 cubic feet a second, uniting into one of one mile long of 4,500 cubic feet per second; at the 9th mile one of 1,500 cubic feet, a second for 5 miles,

and at the 10th mile one of half a mile. These discharges would require width at bottom of 60 and 110 feet respectively, with depths of  $6\frac{1}{2}$  and 8. On the whole there will be 7 miles of the smaller size and one of the larger, thus the excavation would be:—

$$7 \times 5,280 \times 8 \times (50 + 8 + 4) = 18,332,160$$

$$1 \times 5,280 \times 8 \times (110 + 8 + 4) = 5,153,280$$

|          |                                            |     |        |
|----------|--------------------------------------------|-----|--------|
| Total .. | 23,485,440 cubic feet, at 2½ Rs. per 1,000 | ... | 58,713 |
|          | Contingencies at 6 per cent...             | ... | 2,936  |

61,649

|                                                   |              |
|---------------------------------------------------|--------------|
| Land for these channels 1 mile at 660 feet width= | 128 beegahs. |
| 7 miles 330 ditto ..                              | 448 "        |

Total ... .. 576 beegahs.

which at 6 Rs. a beegah will come to Rs. ... 3,456

|                                                                |          |
|----------------------------------------------------------------|----------|
| 6 Inlets of 3 spans with drop to canal bed, at Rs. 8,552* each | 42,760   |
| 6 Escapes, 0 " each at Rs. 10,785†                             | 63,925   |
| 1 Bridge of 4 " of 33 feet near Tilothoo‡                      | 23,000   |
| 1 Do. of 2 " near Ilurna Cheetee‡                              | 15,600   |
|                                                                | 1,05,185 |

Total cost, Rs. ... 2,30,290

This is if block-sinking is necessary in the foundations: If not, the amount will be:—

|                                  |     |     |     |     |     |        |
|----------------------------------|-----|-----|-----|-----|-----|--------|
| Excavation and land as before    | ... | ... | ... | ... | ... | 65,105 |
| 6 Inlets*                        | ... | ... | ... | ... | ... | 21,155 |
| 6 Escapes†                       | ... | ... | ... | ... | ... | 41,525 |
| 1 Bridge, 4 spans of 33 feet...‡ | ... | ... | ... | ... | ... | 17,000 |
| 1 Do. 2 " " ...‡                 | ... | ... | ... | ... | ... | 11,700 |

Total cost, Rs. ... 1,56,785

### Third Plan.

If the Escape Channels were used with the Syphon Drains, a better head of water, and consequently a more rapid discharge, would be obtained by the lowering of the surface of the drainage water west of the Canal. It would thus be possible to reduce the water-way, giving only 7 instead of 10 openings to each drain. This change would admit of a reduction of masonry to the extent of 49,300 cubic feet in the case of under-sunk foundations being required, and 45,000 cubic feet otherwise. Besides this there would be a reduction of masonry in lowering the tail steps to the level of the bed of the excavated channel, making the reduction in all say 54,000 cubic feet in the one case, and 61,000 in the other. We might also dispense with the iron-work, which would no longer be required under the reduced pressure

\* See detailed Estimate No. 8.

† See detailed Estimate No. 7.

‡ See detailed Estimate No. 13.



which would be the consequence of this arrangement; and also with the stone beams in the floor placed there for securing the iron-work.

Thus the total reduction would be :—

|                                              | With under-sunk Foundations. | With ordinary Foundations. |
|----------------------------------------------|------------------------------|----------------------------|
|                                              | Rs.                          | Rs.                        |
| Masonry at Rs. 15 per 100 ... ..             | 8,200                        | 7,650                      |
| Iron-work ... ..                             | 5,173                        | 5,173                      |
| Extra cost of half the stone beams ... ..    | 1,711                        | 1,711                      |
| Contingencies ... ..                         | 754                          | 726                        |
| Total reduction ...                          | 15,838                       | 15,260                     |
| Leaving the cost of each drain ...           | 41,475                       | 27,578                     |
| Hence the total for 5 syphons will be ... .. | 2,07,375                     | 1,37,890                   |
| Excavation and land ... ..                   | 65,105                       | 65,105                     |
| 2 Bridges as before ... ..                   | 38,500                       | 28,700                     |
| Total ... ..                                 | 3,10,980                     | 2,31,695                   |

This plan, though more expensive, is more satisfactory than either of the others; and I have therefore included the sum of Rs. 3,10,980 in the general Estimate.

## No. 6, Dam on the Kao.

|                                                                                                      | No. | L.                    | B.           | D.      | Total  |
|------------------------------------------------------------------------------------------------------|-----|-----------------------|--------------|---------|--------|
| <b>Masonry.</b>                                                                                      |     |                       |              |         |        |
| Foundation Blocks ... ..                                                                             | 10  | (15.75 × 7—12.75 × 4) |              | 17      | 10,000 |
| Ditto ... ..                                                                                         | 41  | (13 × 7—10 × 4)       |              | 17      | 34,148 |
| Ditto ... ..                                                                                         | 7   | (12 × 7—9 × 4)        |              | 17      | 6,712  |
| Ditto ... ..                                                                                         | 8   | (10.5 × 7—7.5 × 4)    |              | 17      | 6,910  |
| Ditto ... ..                                                                                         | 2   | (9 × 7—6 × 4)         |              | 17      | 1,320  |
| Ditto Trapezoidal ... ..                                                                             | 2   | (10 × 13—6 × 11)      |              | 17      | 1,938  |
| Ditto ... ..                                                                                         | 2   | (9 × 11—6 × 5)        |              | 17      | 470    |
| Flooring taken under pier, upper bridge ... ..                                                       | 1   | 75                    | 21           | 2       | 3,150  |
| Main quadrangle ... ..                                                                               | 1   | 110                   | 69           | 2       | 19,580 |
| Lower bridge and below do. segmental portion ... ..                                                  | 1   | 88                    | 75           | 2       | 13,200 |
|                                                                                                      | 1   | 41 × 7                | 0-60         | 2       | 410    |
| Total ... ..                                                                                         | .   | ...                   |              | ...     | 90,580 |
| Deduct 4 quadrants in large quadrangle ... ..                                                        | 4   | 32 × 32               | 0.785 × 0.25 | 2       | 1,096  |
| Rectangles ... ..                                                                                    | 2   | 11                    | 8            | 2       | 352    |
| Total deductions ... ..                                                                              | ... | ...                   | ..           |         | 1,920  |
| Masonry carried forward ... ..                                                                       | ... | ...                   | .            | -       | 87,920 |
| Wing Walls, upper—                                                                                   |     |                       |              |         |        |
| 1st including as far as floor of blocks ... ..                                                       | 2   | 3 11 + 3              | 20 × 6       | 7       | 2,551  |
| 2nd ... ..                                                                                           | 2   | 3 11 + 3              | 20.5 × 5     | 4       | 1,230  |
| 3rd ... ..                                                                                           | 2   | 3 11 + 3              | 30 × 1       | 5       | 1,200  |
| 4th ... ..                                                                                           | 2   | 3 11 + 3              | 20.5 × 3     | 7       | 1,311  |
| Ditto Semi-circle—                                                                                   |     |                       |              |         |        |
| 1st ... ..                                                                                           | 4   | 3 11                  | 20 × 6       | 7       | 13,300 |
| 2nd ... ..                                                                                           | 4   | 3 11                  | 20.5 × 5     | 4       | 7,010  |
| 3rd ... ..                                                                                           | 4   | 3 11                  | 30 × 4       | 5       | 7,238  |
| 4th ... ..                                                                                           | 4   | 3 11                  | 20.5 × 3     | 7       | 8,018  |
| Ditto Curve of 60 feet radius                                                                        |     |                       |              |         |        |
| 1st ... ..                                                                                           | 10  | 25                    | 6            | 7       | 2,100  |
| 2nd ... ..                                                                                           | 10  | 25                    | 5            | 4       | 1,000  |
| 3rd ... ..                                                                                           | 10  | 25                    | 4            | 5       | 1,000  |
| 4th ... ..                                                                                           | 10  | 25                    | 3            | 7       | 1,000  |
| Lower quadrant radius 27 interior, 37 exterior, length of arc allowing for circular ends, say ... .. | 10  | 51                    | (10 + 6)     | 0.5 × 2 | 4,320  |
| 2nd ... ..                                                                                           | 10  | 53                    | (9 + 6)      | 0.5 × 2 | 1,200  |
| 3rd ... ..                                                                                           | 10  | 52                    | (4 + 5)      | 0.5 × 2 | 1,230  |
| 4th ... ..                                                                                           | 10  | 51                    | 7 + 5        | 0.5 × 2 | 1,220  |
| 5th ... ..                                                                                           | 10  | 50                    | 6 + 4        | 0.5 × 2 | 1,000  |
| 6th ... ..                                                                                           | 10  | 49                    | 5 + 4        | 0.5 × 2 | 800    |
| 7th ... ..                                                                                           | 10  | 48                    | 4 + 3.5      | 0.5 × 2 | 720    |
| 8th ... ..                                                                                           | 10  | 47                    | 3 + 3        | 0.5 × 2 | 500    |
| Carried over ... ..                                                                                  | .   | .                     | .            |         | 12,200 |

which would be the consequence of this arrangement; and also with the stone beams in the floor placed there for securing the iron-work.

Thus the total reduction would be:—

|                                              | With under-sunk Foundations. | With ordinary Foundations. |
|----------------------------------------------|------------------------------|----------------------------|
|                                              | Rs.                          | Rs.                        |
| Masonry at Rs. 15 per 100 ... ..             | 8,200                        | 7,650                      |
| Iron-work ... ..                             | 5,173                        | 5,173                      |
| Extra cost of half the stone beams ... ..    | 1,711                        | 1,711                      |
| Contingencies ... ..                         | 754                          | 726                        |
| Total reduction ...                          | 15,838                       | 15,260                     |
| Leaving the cost of each drain ...           | 41,475                       | 27,578                     |
| Hence the total for 5 syphons will be ... .. | 2,07,375                     | 1,37,890                   |
| Excavation and land ... ..                   | 65,105                       | 65,105                     |
| 2 Bridges as before ... ..                   | 38,500                       | 28,700                     |
| Total ... ..                                 | 3,10,980                     | 2,31,695 .                 |

This plan, though more expensive, is more satisfactory than either of the others; and I have therefore included the sum of Rs. 3,10,980 in the general Estimate.

## No 6, Dam on the Kao

|                                                                                                                  | No | L                                         | B                                  | D     | Total              |
|------------------------------------------------------------------------------------------------------------------|----|-------------------------------------------|------------------------------------|-------|--------------------|
| <i>Masonry</i>                                                                                                   |    |                                           |                                    |       |                    |
| Foundation Blocks                                                                                                | 10 | (15 <sup>7</sup> 5×7—12 <sup>7</sup> 5×4) |                                    | 17    | 10 030             |
| Ditto                                                                                                            | 41 | (13×7—10×4)                               |                                    | 17    | 39 114             |
| Ditto                                                                                                            | 7  | (12×7—9×4)                                |                                    | 17    | 5 714              |
| Ditto                                                                                                            | 8  | (10 <sup>5</sup> 5×7—7 <sup>5</sup> ×4)   |                                    | 17    | 5 910              |
| Ditto                                                                                                            | 2  | (3×7—6×4)                                 |                                    | 17    | 1 3 0              |
| Ditto Trapezoidal                                                                                                | 2  | (10×18—6×11)                              |                                    | 17    | 1 938              |
| Ditto                                                                                                            | 2  | (9×11—6×5)                                |                                    | 17    | 4 0                |
| Flooring taken under piers upper bridge                                                                          | 1  | 75                                        | 21                                 | 2     | 3 154              |
| Main quadrangle                                                                                                  | 1  | 110                                       | 89                                 |       | 10 584             |
| Lower bridge and below to segmental portion                                                                      | 1  | 88                                        | 75                                 |       | 13 200             |
|                                                                                                                  | 1  | 41×7                                      | 0 66                               | 2     | 410                |
| Total                                                                                                            |    |                                           |                                    |       | 93 650             |
| Deduct 4 quadrants in large quadrangle                                                                           | 4  | 32×32                                     | 0 <sup>7</sup> 85×0 <sup>7</sup> 5 | 2     | 1 606              |
| Rectangles                                                                                                       | 2  | 11                                        | 8                                  | 2     | 3 54               |
| Total deductions                                                                                                 |    |                                           |                                    |       | 1 900              |
| Masonry carried forward                                                                                          |    |                                           |                                    |       | 1 <sup>7</sup> 906 |
| Wing Walls upper—                                                                                                |    |                                           |                                    |       |                    |
| 1st including as far as floor of blocks                                                                          | 12 | 311+3                                     | 29×6                               | 7     | 2 501              |
| 2nd                                                                                                              | 12 | 311+3                                     | 29 <sup>5</sup> ×6                 | 4     | 1 230              |
| 3rd                                                                                                              | 12 | 311+3                                     | 30×4                               | 5     | 1 2 4              |
| 4th                                                                                                              | 12 | 311+3                                     | 30 <sup>5</sup> ×3                 | 7     | 1 311              |
| Ditto Semi-circle—                                                                                               |    |                                           |                                    |       |                    |
| 1st                                                                                                              | 4  | 311                                       | 29×6                               | 7     | 15 900             |
| 2nd                                                                                                              | 4  | 311                                       | 29 <sup>5</sup> ×6                 | 4     | 7 414              |
| 3rd                                                                                                              | 4  | 311                                       | 30×4                               | 5     | 7 038              |
| 4th                                                                                                              | 4  | 311                                       | 30 <sup>5</sup> ×3                 | 7     | 8 018              |
| Ditto Curve of 60 feet radius                                                                                    |    |                                           |                                    |       |                    |
| 1st                                                                                                              | 12 | 105                                       | 6                                  | 7     | 2 100              |
| 2nd                                                                                                              | 12 | 105                                       | 5                                  | 4     | 1 000              |
| 3rd                                                                                                              | 12 | 105                                       | 4                                  | 5     | 1 000              |
| 4th                                                                                                              | 12 | 105                                       | 3                                  | 7     | 1 000              |
| Lower quadrant radius 2 <sup>7</sup> interior 3 <sup>7</sup> exterior length of arc allow for circular ends, say |    |                                           |                                    |       |                    |
| 2nd                                                                                                              | 12 | 51                                        | (10+6)                             | 0 5×5 | 4 350              |
| 3rd                                                                                                              | 12 | 53                                        | (11+6)                             | 0 5×5 | 1 7 4              |
| 4th                                                                                                              | 12 | 55                                        | (12+5)                             | 0 5×5 | 1 25 4             |
| 5th                                                                                                              | 12 | 51                                        | 7+5                                | 0 5×5 | 1 25 4             |
| 6th                                                                                                              | 12 | 50                                        | 6+4                                | 0 5×5 | 1 000              |
| 7th                                                                                                              | 12 | 49                                        | 5+4                                | 0 5×5 | 7 4                |
| 8th                                                                                                              | 12 | 45                                        | 4+3 5                              | 0 5×5 | 7 4                |
| 9th                                                                                                              | 12 | 47                                        | 3+3                                | 0 5×5 | 7 4                |
| Carried over                                                                                                     |    |                                           |                                    |       | 1 7 906            |

|                                                            | No. | L.                                                | B.                  | D.     | Total.   |
|------------------------------------------------------------|-----|---------------------------------------------------|---------------------|--------|----------|
| Brought forward ...                                        | ... | .....                                             | .....               | .....  | 1,59,398 |
| Walls across Canal bed ...                                 | 2   | 57                                                | 7                   | 2      | 1,596    |
| Abutments—                                                 | 2   | 57                                                | 3                   | 5½     | 1,795    |
| 1st Portion ...                                            | 4   | 19                                                | 6                   | 7      | 3,192    |
| 2nd ...                                                    | 4   | 19                                                | 5                   | 4      | 1,520    |
| 3rd ...                                                    | 4   | 19                                                | 4                   | 5      | 1,520    |
| 4th (behind arch) ...                                      | 4   | 19                                                | 1.5                 | 7      | 798      |
| Piers, bodies (including grooves seats)                    | 10  | 20                                                | 3                   | 14     | 8,400    |
| Do. Starlings to top of parapet                            | 15  | $\frac{7854}{2}$                                  | 3²                  | 24     | 1,272    |
| Do. Steps ...                                              | 5   | 1                                                 | 3                   | 21     | 315      |
| Do. Do. ...                                                | 5   | $\frac{2}{2}$                                     | 3                   | 21     | 3,307    |
| Arching ...                                                | 12  | 19                                                | $\frac{13²-10²}{2}$ | 0.7854 | 6,178    |
| Spandrills (solid) ...                                     | 12  | $13² (1.0 - 0.7854) \times 19 \times \frac{1}{2}$ |                     |        | 4,134    |
| Parapets over bridge ...                                   | 4   | 75                                                | 1.5                 | 3      | 1,350    |
| “ circular wings ...                                       | 4   | 3.1416                                            | 15.5 × 1.5          | 3      | 862      |
| “ upper curved wings                                       | 2   | $\frac{31416}{3}$                                 | 31.25 × 1.5         | 3      | 294      |
| “ Lower ditto ...                                          | 2   | 19                                                | 1.5                 | 3      | 171      |
| Total Masonry...                                           | ... | ...                                               | ...                 | ...    | 196,102  |
| <i>Concrete.</i>                                           |     |                                                   |                     |        |          |
| Under floors: 1½ flooring as entered above ...             | ... | 3,150                                             |                     |        |          |
|                                                            | ... | 19,580                                            |                     |        |          |
|                                                            | ... | 13,200                                            |                     |        |          |
|                                                            | ... | 410                                               |                     |        |          |
|                                                            | ... | .....                                             | 36,340              |        |          |
|                                                            | ... |                                                   | 1,936               |        |          |
|                                                            | 1.5 | .....                                             | 34,380              | .....  | 51,570   |
| Deduct Blocks ...                                          | 10  | 15.75                                             | 7                   | 3      | 3,307    |
| Ditto ...                                                  | 8   | 13                                                | 7                   | 3      | 2,184    |
| Ditto ...                                                  | 6   | 12                                                | 7                   | 3      | 1,512    |
| Ditto ...                                                  | 2   | 10.5                                              | 7                   | 3      | 441      |
| Projecting portions of blocks under curtains and wings ... | 2   | 10                                                | 2                   | 3      | 120      |
| Total deductions...                                        | ... | .....                                             | .....               | .....  | 7,664    |
| Total Concrete...                                          | ... | .....                                             | .....               | .....  | 43,906   |
| <i>Excavation.</i>                                         |     |                                                   |                     |        |          |
| In Kao ...                                                 | ... | 300                                               | $\frac{40}{3}$      | 18     | 108,000  |
| In Canal ...                                               | ... | 300                                               | $\frac{10}{3}$      | 11     | 19,800   |
| Below Canal in quadrangle ...                              | ... | 89                                                | 110                 | 10     | 97,900   |
| Total Excavation...                                        | ... | .....                                             | .....               | .....  | 2,25,700 |
| Gates with apparatus complete superficial feet ...         | 10  | 11                                                | $10\frac{3}{4}$     | .....  | 1,182    |

|                                            | No | L   | B. | D  | Total  |
|--------------------------------------------|----|-----|----|----|--------|
| <i>Dry Stone work</i>                      |    |     |    |    |        |
| Canal bed                                  | 2  | 80  | 30 | 25 | 12 000 |
| Do up stream                               | 1  | 10  | 20 | 25 | 4 500  |
| Do down do.                                | 1  | 90  | 40 | 30 | 10 500 |
| banks in<br>cluded                         |    |     |    |    |        |
| Total                                      |    |     |    |    | 27 000 |
| <i>Metalling</i>                           |    |     |    |    |        |
| First                                      | 2  | 75  | 10 | 05 | 1 200  |
| Second                                     | 4  | 20  | 24 | 05 | 900    |
| Total                                      |    |     |    |    | 2 100  |
| <i>Cut Stone work</i>                      |    |     |    |    |        |
| Coping of all parapets                     |    | 191 | 20 | 05 | 590    |
| Setting course under ditto                 |    | 591 | 10 | 05 | 2 700  |
| Ditto second lining walls                  |    | 250 | 10 | 05 | 1 250  |
| Ditto round tops of piers and<br>abutments | 21 | 215 | 10 | 05 | 280    |
| Faces of arches                            | 21 | 16  | 10 | 15 | 600    |
| Grooves                                    | 21 | 21  | 10 | 05 | 250    |
| Total                                      |    |     |    |    | 2 120  |

## ABSTRACT

|         |                                                            |        |
|---------|------------------------------------------------------------|--------|
| 275 000 | Cut feet of Excavation at Rs. 6 per 1 000                  | 1 650  |
| 161 000 | Ditto of Masonry at Rs. 15 per 100                         | 24 150 |
| 6,178   | Ditto Arching at Rs. 20 per 100                            | 1 236  |
| 43 000  | Ditto Concrete at Rs. 12 per 100                           | 5 160  |
| 75      | Blocks curb frames at Rs. 25 each                          | 1 875  |
| 75      | Ditto sinking at Rs. 50 each                               | 3 750  |
| 2,120   | Cut feet of cut stone-work at Rs. 30 per 100               | 636    |
| 1 142   | Superficial feet of gates with apparatus at Rs. 3 per foot | 3 426  |
| 27 000  | Cut feet dry stone work at Rs. 6 per 100                   | 1 620  |
| 2 100   | Metalling round ways, at Rs. 6 per 100                     | 126    |
|         | Contingencies, at 5 per cent                               | 2 500  |

Grand Total Cost Rs. 50 921

If however the work should prove good, as appears probable there will be a reduction of the following items—

|                                                                        |       |
|------------------------------------------------------------------------|-------|
| Three-fourths of the masonry in blocks or 4 602 cut feet, at Rs. 15 .. | 7 110 |
| The concrete .. .. .                                                   | 5 160 |
| The sinking of the blocks .. .. .                                      | 3 750 |
| The Curb frames .. .. .                                                | 1 875 |
| Share of Contingencies .. .. .                                         | 1 250 |

In all Rs. 18 945

Leaving the cost of the Dam in that case Rs. 31 976

The final sum however is estimated for the Rs. 50 921

## No. 7, ESCAPES.

*A. Wing walls and abutments with two semi-arches.*

|                                                   | No. | L.                                                      | B.              | D.              | Total. |
|---------------------------------------------------|-----|---------------------------------------------------------|-----------------|-----------------|--------|
| <i>Masonry.</i>                                   |     |                                                         |                 |                 |        |
| Foundation wells under semi-circular wings ... .. | 8   | $(8^2 - 5^2)$                                           | 0.7,854         | 12              | 2,940  |
| Blocks ... ..                                     | 2   | $(8\frac{3}{4} \times 7) - (5\frac{3}{4} - 4)$          |                 | 12              | 1,428  |
| Ditto ... ..                                      | 2   | $(9\frac{1}{2} \times 7) - (6\frac{1}{2} \times 4)$     |                 | 10              | 810    |
| Ditto ... ..                                      | 5   | $(12 \times 7) - (9 \times 4)$                          |                 | 12              | 2,880  |
| Ditto ... ..                                      | 9   | $(12 \times 7) - (9 \times 4)$                          |                 | 10              | 4,320  |
| Front semi-circular wing walls ...                | 2   | $\frac{3 \cdot 1,416}{2} \times 13\frac{1}{2} \times 3$ |                 | 8 $\frac{1}{2}$ | 1,081  |
| Rear quadrants ... ..                             | 2   | $\frac{3 \cdot 1,416}{4} \times 13\frac{1}{2} \times 3$ |                 | 10              | 636    |
| Ditto ... ..                                      | 2   | $\frac{3 \cdot 1,416}{4} \times 11\frac{1}{2} \times 1$ |                 | 5 $\frac{1}{2}$ | 99     |
| Front straight portion of wall ...                | 2   | 4 $\frac{1}{2}$                                         | 3               | Mean.<br>10     | 270    |
| Rear ditto ditto ... ..                           | 2   | 41                                                      | 3               | 10              | 2,460  |
| Ditto ditto ditto ... ..                          | 2   | 10                                                      | 3               | 9               | 540    |
| Ditto ditto ditto ... ..                          | 2   | 3                                                       | 3               | 8               | 144    |
| Ditto ditto ditto ... ..                          | 2   | 41                                                      | 1               | 5 $\frac{1}{2}$ | 451    |
| Ditto ditto ditto ... ..                          | 2   | 10                                                      | 1               | 4 $\frac{1}{2}$ | 90     |
| Ditto ditto ditto ... ..                          | 2   | 3                                                       | 1               | 3 $\frac{1}{2}$ | 21     |
| Ditto ditto ditto steps }<br>near bridge ... ..   | 2   | $\frac{7+2}{2}$                                         | 3               | 2 $\frac{1}{2}$ | 67     |
| Abutment blocks ... ..                            | 4   | 3                                                       | 6               | 10              | 720    |
| Ditto walls ... ..                                | 2   | 16                                                      | 4               | 6               | 768    |
| Ditto ditto ... ..                                | 2   | 16                                                      | 2               | 4               | 256    |
| Skew backs of arches ... ..                       | 2   | $\frac{19}{2}$                                          | 1.2             | 0.9             | 20     |
| Two semi-arches ... ..                            | 1   | 11 $\frac{3}{4}$                                        | 19              | 1 $\frac{1}{2}$ | 332    |
| Spandrills, solid ... ..                          | 1   | $12.4 \times 31 - 21.44$                                |                 | 19              | 323    |
| Dwarf pillars ... ..                              | 4   | 2 $\frac{1}{2}$                                         | 2 $\frac{1}{2}$ | 3 $\frac{1}{2}$ | 87     |
| Parapets ... ..                                   | 4   | 5                                                       | 1 $\frac{1}{2}$ | 3 $\frac{1}{2}$ | 105    |
| Flooring over blocks ... ..                       | 8   | $8^2 \times$                                            | 0.7,854         | 2               | 804    |
| Ditto ditto ... ..                                | 2   | 8 $\frac{3}{4}$                                         | 7               | 2               | 245    |
| Ditto ditto ... ..                                | 2   | 9 $\frac{1}{2}$                                         | 7               | 2               | 266    |
| Ditto ditto ... ..                                | 14  | 12                                                      | 7               | 2               | 2,352  |
| Ditto under semi-arches ...                       | 2   | 64                                                      | 4               | 2               | 1,024  |
| Ditto intervals of blocks in curtain-wall ... ..  | 8   | 3                                                       | 2               | 2               | 96     |
| Ditto ditto ditto ... ..                          | 5   | 7                                                       | $\frac{1}{2}$   | 2               | 35     |
| Ditto ditto ditto ... ..                          | 7   | 7                                                       | 1               | 2               | 98     |
| Total Masonry ... ..                              | ... | ...                                                     | ...             | ...             | 25,768 |
| <i>Excavation.</i>                                |     |                                                         |                 |                 |        |
| Straight portion... ..                            | 2   | 102                                                     | 11              | 12              | 26,928 |
| Curved wings ... ..                               | 2   | 36                                                      | 8               | 10              | 5,760  |
| Tail ditto ... ..                                 | 2   | 18                                                      | 8               | 12              | 3,456  |
| Total Excavation ... ..                           | ... | ...                                                     | ...             | ...             | 36,144 |

|                                     | No. | L.  | R. | D.  | Total. |
|-------------------------------------|-----|-----|----|-----|--------|
| Sluice shutters . . . . .           | 2   | 3   |    | 7   | 77     |
| Dry stone-work . . . . .            | 2   | 20  | 6  | 3   | 720    |
|                                     | 20  | 15  | 15 | 2   | 900    |
|                                     |     | ..  |    |     | 1720   |
| Metalting . . . . .                 | 2   | 15  | 10 | 0.5 | 100    |
| <b>Cut Stone work</b>               |     |     |    |     |        |
| Coping of parapets . . . . .        | 2   | 10  | 2  | 0.5 | 20     |
| Ditto of pillars . . . . .          | 4   | 25  | 25 | 0.5 | 125    |
| String course of parapets . . . . . | 2   | 10  | 1  | 0.5 | 10     |
| Ditto of pillars . . . . .          | 4   | 8   | 1  | 0.5 | 16     |
| Face of arch . . . . .              | 2   | 11  | 1  | 1.5 | 33     |
| Front grooves . . . . .             | 2   | 6.5 | 1  | 0.5 | 15     |
| Rear ditto . . . . .                | 2   | 11  | 1  | 0.5 | 11     |
| Total                               |     | ..  |    |     | 100    |

## ABSTRACT

|                                                                                 | Rs.   |
|---------------------------------------------------------------------------------|-------|
| 36144 Cubic feet of Excavation, at Rs. 5 per 1000 .. . . .                      | 181   |
| 25768 Ditto Masonry, at Rs. 15 per 100 . . . . .                                | 3,865 |
| 10 Blocks curb frames, at Rs. 25 each . . . . .                                 | 400   |
| 10 Ditto at Rs. 15 each . . . . .                                               | 150   |
| 20 Sinking blocks, 15 feet, at Rs. 60 each . . . . .                            | 1,200 |
| 77 Square feet sluice shutters, with apparatus complete, say at Rs. 3 . . . . . | 231   |
| 1,720 Dry stone-work, with puling at Rs. 8 per 100 . . . . .                    | 130   |
| 100 Cubic feet cut stone work, extra charge, at Rs. 30 . . . . .                | 30    |
| 100 Cubic feet of metalting, at Rs. 6 per 100 . . . . .                         | 10    |
| Contingencies, at 5 per cent . . . . .                                          | 31    |
| Total Rs. . . . .                                                               | 6,615 |

If the soil were such as to render block sinking unnecessary, there would be a saving of nearly  $\frac{1}{2}$  of the masonry in blocks, or say 9,000 cubic feet of masonry, at Rs. 15 per 100 . . . . .

|                               |   |   |   |   |   |   |   |           |       |
|-------------------------------|---|---|---|---|---|---|---|-----------|-------|
| Curb frames                   | — | — | — | — | — | — | — | —         | 600   |
| Sinking blocks                | — | — | — | — | — | — | — | —         | 1,200 |
| Contingencies, at 5 per cent. | — | — | — | — | — | — | — | —         | 100   |
|                               |   |   |   |   |   |   |   | Total Rs. | 3,250 |

Leaving as the cost of two abutments and semi-arches of the Escape Rs. . . . .



*B. Pier with two semi-arches.*

|                                                                 | No. | L.                 | B.             | D.                        | Total. |
|-----------------------------------------------------------------|-----|--------------------|----------------|---------------------------|--------|
| <i>Masonry.</i>                                                 |     |                    |                |                           |        |
| Foundation blocks ... ..                                        | 2   | 11 × 7—8 × 4       |                | 10                        | 900    |
| Ditto ... ..                                                    | 1   | 11 × 7—8 × 4       |                | 11                        | 495    |
| Ditto ... ..                                                    | 1   | 11 × 7—8 × 4       |                | 12                        | 540    |
| Ditto ... ..                                                    | 1   | 12½ × 7—9½ × 4     |                | 10                        | 495    |
| Ditto ... ..                                                    | 1   | 12½ × 7—9½ × 4     |                | 12                        | 594    |
| Flooring over all .. ..                                         | 1   | 78                 | 13             | 2                         | 2,028  |
| Total ... ..                                                    | ... | ...                | ...            | ...                       | 5,052  |
| Pier under bridge to spring ...                                 | 1   | 19                 | 3              | 6                         | 342    |
| Upper semi-circular end ...                                     | 1   | $\frac{7,854}{2}$  | 3 <sup>a</sup> | 6·5                       | 23     |
| Straight portion as far as groove                               | 1   | 2                  | 3              | 6·5                       | 39     |
| From that to bridge ... ..                                      | 1   | 5½                 | 3              | $\frac{9+11}{2}$          | 165    |
| Flat portion below bridge,<br>curved ends taken square ...      | 1   | 3                  | 3              | 18½                       | 166    |
| First step from top ... ..                                      | 1   | 1                  | 3              | 10                        | 30     |
| Steps above slope in floor ...                                  | 1   | 10                 | 3              | $\frac{7+10}{2}$          | 255    |
| Ditto below ditto ... ..                                        | 1   | 13                 | 3              | $\frac{7+\frac{1}{2}}{2}$ | 146    |
| Two semi-arches as in Part A ...                                | 1   | 11½                | 19             | 1½                        | 332    |
| Skew backs ... ..                                               | 2   | $\frac{19}{2}$     | 1·2            | 0·9                       | 20     |
| Spandrill, solid ... ..                                         | 1   | (12·4 × 3·1—21·44) |                | 19                        | 323    |
| Parapets ... ..                                                 | 2   | 10                 | 1½             | 3½                        | 105    |
| Total Masonry ... ..                                            | ... | ...                | ...            | ...                       | 6,998  |
| <i>Excavation.</i>                                              |     |                    |                |                           |        |
| In excess of what is calculated in<br>the escape channel ... .. | 200 | 6                  | 7              | ...                       | 8,400  |
| And below level of floor ... ..                                 | 102 | 13                 | 5              | ...                       | 6,630  |
| Total Excavation ... ..                                         | ... | ...                | ...            | ...                       | 15,030 |
| Dry stone-work ... ..                                           | 1   | 35                 | 13             | 3                         | 1,365  |
| Sluice shutters ... ..                                          | 2   | $\frac{11}{2}$     | ...            | 7                         | 77     |
| Metalling road-way ... ..                                       | 1   | 13                 | 16             | ½                         | 104    |
| <i>Cut Stone-work.</i>                                          |     |                    |                |                           |        |
| As in A, omitting the pillars ...                               | ... | .....              | .....          | .....                     | 80     |

## ABSTRACT

|                                                                   | Rs.   |
|-------------------------------------------------------------------|-------|
| 15 000 Cubic feet of Excavation at Rs. 5 per 1 000                | 75    |
| 6,998 Ditto Masonry, at Rs. 15 per 100                            | 1 050 |
| 6 Blocks sinking at Rs 50 each                                    | 300   |
| 6 Ditto, Curbs, at Rs 25 each                                     | 150   |
| 80 Cubic feet cut stone work at Rs. 30 per 100                    | 24    |
| 1,365 Cubic feet of Dry stone work, with piles at Rs. 8 per 100   | 109   |
| 104 Ditto Metalling road way, at Rs. 6 per 100                    | 6     |
| 753 Ditto Sluice shutters, apparatus included, at Rs. 3 per foot, | 221   |
| Contingencies                                                     | 97    |
| Total Rs.                                                         | 2 031 |

If the soil be such as not to require block sinking, deduct as follows —

|                                                         | Rs.       |
|---------------------------------------------------------|-----------|
| 3 500 Cubic feet of masonry in blocks at Rs. 15 per 100 | 525       |
| Curb frames                                             | 150       |
| Sinking blocks                                          | 300       |
| Contingencies at 5 per cent                             | 43        |
| Total Rs.                                               | 1 021     |
| Leaving the cost of the pier and two semi-spans         | Rs. 1 010 |

## GENERAL ABSTRACT

| With Block sinking           | Add.  | Total  |
|------------------------------|-------|--------|
| Escape of 1 opening as per A | —     | 6 715  |
| 2 openings, adding as per B  | 2 031 | 8 746  |
| 3 ditto                      | 2 031 | 10 777 |
| 4 ditto                      | 2 031 | 12 717 |
| 5 ditto                      | 2 031 | 14 751 |
| 6 ditto                      | 2 031 | 16 785 |
| 8 ditto                      | 2 031 | 18 819 |
| Without Block-sinking        |       |        |
| 1 opening                    | —     | 3 255  |
| 2 ditto                      | 1 010 | 4 265  |
| 3 ditto                      | 1 010 | 5 275  |
| 4 ditto                      | 1 010 | 6 285  |
| 5 ditto                      | 1 010 | 7 295  |
| 6 ditto                      | 1 010 | 8 305  |
| 8 ditto                      | 1 010 | 10 335 |

As an average, the cost will be taken as follows in the general estimate for the Canals of the 1st, IIrd and IIIrd Classes.

|                            | Average of the two. | Amount used. |
|----------------------------|---------------------|--------------|
| Escape of 1 opening ... .. | 4,935               | 5,000        |
| 2 ditto ... ..             | 6,457               | 6,000        |
| 3 ditto ... ..             | 7,979               | 8,000        |
| 4 ditto ... ..             | 9,501               | 9,500        |
| 5 ditto ... ..             | 11,023              | 11,000       |
| 6 ditto ... ..             | 12,545              | 12,500       |
| 8 ditto ... ..             | 14,067              | 14,000       |

For the other classes of Canals the cost of Escapes will be taken as follows:—

|                           | Cost of Escapes of |                  |                  |                  |
|---------------------------|--------------------|------------------|------------------|------------------|
|                           | 10 feet opening.   | 20 feet opening. | 30 feet opening. | 40 feet opening. |
| Classes IV. and V. ... .. | 4,000              | 5,250            | 6,500            | 7,750            |
| Class VI. ... ..          | 3,000              | 4,000            | 5,000            | 6,000            |
| Class VII. ... ..         | 2,500              | 3,250            | 4,000            | .....            |
| Class VIII. ... ..        | 2,000              | 2,600            | .....            | .....            |
| Class IX. ... ..          | 1,500              | 2,000            | .....            | .....            |
| Class X. ... ..           | 1,000              | .....            | .....            | .....            |

## A. Wing walls, abutments, and two semi-arches.

|                                                  | No. | L.                    | R.  | D.  | Total. |
|--------------------------------------------------|-----|-----------------------|-----|-----|--------|
| <i>Masonry.</i>                                  |     |                       |     |     |        |
| Foundation blocks ..                             | 4   | (9.5 × 7) - (5.5 × 4) |     | 12  | 1,500  |
| Ditto ... ..                                     | 4   | (10 × 7 - 7 × 1)      |     | 12  | 2,010  |
| Ditto ... ..                                     | 10  | (13 × 7 - 10 × 4)     |     | 12  | 6,120  |
| Flooring over ditto ..                           | 4   | 8.5                   | 7   |     | 470    |
| Ditto ... ..                                     | 4   | 10                    | 7   |     | 500    |
| Ditto ... ..                                     | 10  | 13                    | 7   |     | 1,820  |
| Flooring of inlet ..                             | 2   | 27.5                  | 5   |     | 550    |
| Steps .. ..                                      | 2   | 18                    | 5   |     | 900    |
|                                                  |     |                       |     |     | 14,212 |
| Deduct hollow under steps taken triangular .. .. | 2   | 0                     | 5   |     | 150    |
|                                                  |     |                       |     |     | 14,062 |
| Part wall at back of ditto ..                    | 2   | 5                     |     | 10  | 200    |
| Abutment walls between counterforts .. ..        | 2   | 13                    | 4   | 0   | 836    |
| Ditto ditto ditto ..                             | 2   | 13                    | 2.5 | 1   | 63     |
| Ditto ditto ditto ..                             | 2   | 13                    | 1.5 |     | 78     |
| Ditto ditto ditto ..                             | 2   | 13                    | .5  | 3.5 | 45     |
| Counterforts .. ..                               | 8   | 7                     |     | 0   | 1,008  |
| Ditto .. ..                                      | 8   | 5.5                   |     | 6.5 | 572    |
| Wing walls straight portion ..                   | 2   | 21                    | 4   | 0   | 1,728  |
| Ditto ditto ..                                   | 2   | 21                    | 3   | 6.5 | 930    |
| Ditto curved upper ..                            | 2   | 16.5 × 3 1116         | 3   | 15  | 1,555  |
| Ditto lower .. ..                                | 2   | 10                    | 4   | 0   | 720    |
| Ditto ditto .. ..                                | 2   | 10                    | 3   | 3.5 | 210    |
| Ditto ditto .. ..                                | 2   | 10                    | 3   | 5.5 | 330    |
| Ditto ditto .. ..                                | 2   | 12                    | 2   | 15  | 72     |
| Two semi-arches .. ..                            | 1   | 11.5 × 3 1116         | 19  | 15  | 495    |
| Spandrills, solid .. ..                          | 1   | 13 × (1 - 0.7551)     |     | 19  | 374    |
| Parapets .. ..                                   | 4   | 5                     | 15  | 3.5 | 100    |
| Dwarf pillars .. ..                              | 4   | 2.5                   | 2.5 | 3.5 | 87     |
| Total Masonry ..                                 |     |                       |     |     | 23,278 |
| <i>Cut Stonework.</i>                            |     |                       |     |     |        |
| Sloping to parapets ..                           | 2   | 14                    | 20  | 0.5 | 20     |
| String course below ditto ..                     | 2   | 14                    | 10  | 0.5 | 10     |
| Ditto in wing walls and abutments ..             | 2   | 30                    | 10  | 0.5 | 30     |
| Faces of arch .. ..                              | 2   | 14                    | 10  | 1.5 | 42     |
| Total ..                                         |     |                       |     |     | 110    |

The following will be the deductions if blocks of stone are used for the  
 $\frac{1}{4}$ th of masonry in blocks, or say 2.772 cubic feet at \$1.12

|                              |     |     |     |     |     |     |     |     |     |
|------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Curb frames                  | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Sinking blocks               | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Contingencies at 5 per cent. | ... | ... | ... | ... | ... | ... | ... | ... | ... |

TOTAL

Leaving the cost of the pier and two sub-piers ...

### GENERAL ABSTRACT.

|                | With<br>Blocks. | With<br>Piers. | Per<br>Cent. |
|----------------|-----------------|----------------|--------------|
| One opening    | 5.255           | 2.772          | 1.12         |
| Two openings   | 1.757           | 1.757          | 1.12         |
| Three openings | 6.903           | 5.455          | 1.12         |
| Four openings  | 1.627           | 1.627          | 1.12         |
| Five openings  | 8.532           | 1.627          | 1.12         |

The amounts in the last column are taken in the General  
 Note of this description are required on the work.

learn that a man brought two letters without signature from Moozuffurabad addressed to the force in Pukh saying, "Are you Sikhs? if so, what do you here when your Goofoo is calling you at Mooltan," and that a man brought a letter from Moolraj addressed to the same soldiery to nearly the same effect, adding "I have commenced the fight at your call and you leave me to perish unaided." From two different quarters I hear that the son of General Sooltan Mahmood wrote his father lately saying, "I have prepared all the troops for a start but my guns are imprisoned in the fort of Bunnoo. Nevertheless, I have gained over some of the garrison, and we will murder Finteh Khan and set the guns free." The General was a protégé of Raja Taja Singh, but whether from policy or change of relations the General abuses the Raja. The soldiers of the Pukh force confirm the intelligence elsewhere received that they are in expectation of being joined by the whole of the Huzara and Qatur forces, and by the army of Maharaja Goolab Singh. If proper precautions are taken, this movement may save a world of suspense and uncertainty. It will show at once the state of the Sikh army and the steps necessary in consequence, but I am not sure that the force will venture to move unless the Pukh Brigade can make its escape, and *that* it is my study to prevent. I have not received a word of news from Lahore for many days, and know not whether my warnings have led to the adoption of any precautionary measures.

J. ABBOTT, CAPTAIN,  
*Assistant Resident*

The intelligence elsewhere recorded of the Cabul Ruler's refusal to join Sardar Chuttur Singh is confirmed by intelligence from Peshawur.

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No. 84—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, from the 6th to the 13th August 1848.

*6th August 1848—Huzara, Sherwain*—Last evening Sardar Chuttur Singh sent me a confidential Vuqueel to endeavour to lull my doubts of his most extraordinary conduct and at the same time to ascertain how much I knew of his guilt. His letter merely express the impossibility of a person so favored as he had been turning traitor. I replied to his Vuqueel that I hoped he was as true as he wished me to believe, but that it was most difficult for me to comprehend how a

mutiny of his forces could be carried on for two months and the Gahndia Brigade he actually prepared for a march to Lahore without his cognizance, when it had long been notorious to the whole country that the measures I had been obliged to take to coerce his soldiery were exactly such as I would have taken had his conduct been altogether free from suspicion, and that therefore if as he said he had no faith in the Sikh troops it was the more necessary that I should not rely upon his power to order their movements. It was strange that whilst expressing this want of faith he should take upon himself contrary to my orders to order up three companies from Hussun Uddal the consequences of this step might be most serious and I would not answer for them that it would soon become evident who were innocent and who guilty and that I suspended judgment until full evidence should be afforded me that he must march back the companies aforesaid and order all troops to keep their cantonments, otherwise I should consider any movement of troops as a signal of rebellion that as to his wish to send me his son as a proof of his sincerity I could not place that son under restraint and his being near me were no security, in fact the presence of his son with a large retinue and a purse heavier than my own would be most embarrassing at the present moment as nothing could be done without his cognizance, whilst at the same moment he would not be responsible for the movement of the army and any measure of mine to arrest the march of mutineers would be frustrated by his previous knowledge of my movements, whilst his intrigues with the army would appear incredible because his son was in my power.

This morning on my return from my walk I received a note from Colonel Canara saying that the Sirdar had ordered the troops and his guns to encamp outside the city that he had remonstrated saying that such a move at such a moment would subject them to the charge of rebellion it being without my sanction; that the Sirdar had sent his confidential servants to win him over but in vain that he thought there would be a struggle for the guns that night and that he begged my instructions how to act. If he was to resist he begged support. I had hardly read his note before his murder was reported to me. The Sirdar it seems sent two companies to seize the guns by force. Colonel Canara loaded them with grape and ordered his golundauze to fire

They shrank from him, saying they were the Sirdar's servants. His Havildar still refusing to apply the match, Canara cut him down and applied it with his own hand. It burnt priming and he was immediately shot by two sipahis; it is said that he rose to cut down another assailant when his own neck was severed. Thus died a man who, whatever the defects of education and infirmities of nature, closed his career with an act of gallantry and loyalty unsurpassed by anything I can remember in history. I most earnestly trust that the family of this brave and faithful officer may be suitably provided for, they live in Lahore. And I as earnestly trust that measures of retribution upon the brutal and wanton murderer will be speedily adopted.

What his present design is can only be conjectured. I believe that he thinks his deep and treacherous conduct is laid bare and that his only hope is to collect a force around him and trust to support from Jumboo and union with Moolraj. I am confirmed in this opinion by the arrival of a messenger from Major Lawrence, who states that he met two emissaries from Sirdar Chuttur Singh, who said they had been sent by him to excite a mutiny in Peshawar. They were Sikh soldiers. He has written also to levy large bodies of irregular troops, unless my information deceive me. The Pukh force is still in duration, but he is making extraordinary efforts to set it free and has gained over many of the chiefs and Mulliks. It is said that the cause of this rise in Pukh and Huzara was the fear that Sirdar Jhundur Singh, who has the credit of having been a great intriguer, had been ordered to Lahore for imprisonment and trial. I am aware that this idea was for a time prevalent and caused Sirdar Chuttur Singh some dismay.

*8th August 1848*—I waited until evening for some explanation from Sirdar Chuttur Singh, but as none arrived, I collected the chiefs of Huzara and ordered them to take measures for preventing the march of troops to Hurripoor. Unfortunately the valley is too open for the contest of zumeendais with regular troops. I also resolved upon changing my position from Sherwaun to Gundgurb, the latter being nearer to Hurripoor and affording greater means of offensive operations. Accordingly on the night of the 7th we left Sherwaun and reached Nara at the foot



of the Gundgurb mountain the evening following our baggage has not arrived. On the road Jehandad Khan put into my hand a letter just received from Sirdar Chuttur Singh reminding him of a conversation with the Chief's Vuzeer in which he the Sirdar, had promised him extension of jaghir upon condition of certain services that he now called upon him to fulfil his part of the covenant and assured him that the fulfilment should be mutual. I hope this Chief may be in earnest in his present profession of loyalty and that the night visit to the Sirdar formerly noted may not have been made by himself but by the Vuzeer, a man of the most profligate character. This is a tangible proof that Sirdar Chuttur Singh has been tampering with the Huzara chiefs for several months past, promising them extension of jaghir upon condition of their aiding him in some meditated enterprise. The mistake under which so many people fell (according to this supposition), *vis*, of supposing that because the Vuzeer was of the party, Jehandad Khan was also there was easily made by night.

*9th August 1848—Nara*—The Sirdar continues to summon troops to his assistance, although I have assured him that upon sending me the murderers and ordering back the troops I will settle the whole country by means of a couple of chuprassies. Strange reports have been abroad but to-day we were favored with a dak which had escaped the hands of the Sirdar and learn with infinite relief that the Peshawur Agency continues peaceful. The dak contained no news from Lahore. Indeed it is very long since I have had any intelligence of what is passing in that quarter or at Wootan and am wholly ignorant whether the many intimations I have given of secret proceedings here have led to precautions.

*10th August—Nara*—To-day a note from Attock informed me of Captain Nicholson's arrival there. He had turned out the Sikh company with some difficulty and was in possession of that important fort and passage. This is an able and well timed move, for his presence in Potowar is greatly needed. My chief deficiency here is in funds for the supply of which I trust arrangements will be made at Lahore. A report has just reached me from a good source that the Sikhs are thinking only how they may disengage the Pukhl Brigade in order to march upon Lahore. They confidently expect to be joined by the Peshawur force and a messenger from Peshawur met two of the Sirdar's

emissaries sent, as they assured him, to raise a mutiny there. They also say, and I beg to recommend the subject for investigation, that a portion of our Native troops are in treaty to play the traitor at Lahore. It has been a mistake from the first to regard this insurrection as an isolated instead of as a national movement, in so far, at least, as the sect of Sikhs can be considered a Nation. The Hussun Ubdal force marched up toward Hurripoor by order of Sirdar Chuttur Singh, and in spite of the remonstrances of the Commanding Officers Colonel Boodh Singh, Maun, finding himself set at naught, left the corps and returned to his home. Unfortunately the intermediate space is too open for such a force to be coped with by peasantry. They will reach Hurripoor to-morrow.

*11th August 1848—Nara*—The Hussun Ubdal force reached Hurripoor to-day and there is a report that the cavalry of Mhaitab Singh, Majitea, is in full march to join it, although that Sirdar has expressed his determination not to move without my orders. A report has arrived to-day stating that Raja Sher Singh has actually joined Moolraj. But weeks may elapse ere we know whether or not it has foundation. A letter from the Sirdar Chuttur Singh to Jehandad Khan came by chance into my hand. He calls upon him to remember the past and that he had depended upon the chief to aid him in emergency and enquires why his letters are unanswered. He concludes by saying, "You must bring the Sahib with you to Hurripoor," meaning of course that he is to seize me.

*12th August—Nara*—This day I intercepted a bag of letters from Sirdar Chuttur Singh to Maharaja Goolab Singh, Meean Runbeer Singh and Raja Jowahir Singh, imploring them instantly to send him four regiments from Moozuffiabad and all the Meerpoor force and to write to the Peshawar troops to join him. I despatched this evening, at his own particular request, Lieutenant Robinson of Engineers to Mahugul, the pass leading from Pukli, to encourage the peasantry to cut off the retreat of the Sikhs, my departure from Tunnole having led to much defection.

*13th August*—To-day the report from Lahore states that the Gahndia force is actually free of its limbo and arrived at Nowa Shahr. I trust this is unfounded and from the statements of subsequent emissaries am inclined to doubt it. The talk of the Sikh soldiery at Hurripoor is the old story of a march upon Lahore the instant the

Pukli Brigade is disengaged. Captain Nicholson's possession of the fort of Attock will, I trust, disconcert such an intention. It is observable that the Sirdar whilst charging upon me all the onus of the present state of the army and country does not seem to have resorted to the obvious remedy, *viz* an appeal to the Resident, but launches at once into open rebellion inciting the army to mutiny and inviting foreign invasion. How flimsy an excuse is his may be argued from this circumstance. In fact the present state of things is what has long been contemplated by the insurgents excepting only the necessity of the chief movers appearing in person occasioned by the arrest of the Pukli Brigade and the brutal murder of Colonel Canara. For the last two months my intelligence has pointed to this result but that excessive caution which characterizes Sikh policy has from time to time deferred the event as other results have disappointed expectation.

J ABBOTT CAPTAIN

*Assistant Resident*

12 Noon—Sirdar Chuttur Singh to his insulting letter to me of yesterday acknowledges having paid the murderers of Colonel Canara one thousand rupees.

J ABBOTT

No 85—Diary of Captain James Abbott, Assistant Resident on deputation to Huzara, from the 13th to the 15th August 1848.

13th August 1848—Nara Huzara—The last letter of Sirdar Chuttur Singh is couched in terms admitting of no further intercourse of a friendly character. Nevertheless previous to commencing a war of extermination with the mutinous troops whom he has called about him a war inflicting upon the innocent people of the country wide and mournful ravage, I have allowed his Vuqueel to depart with a schedule of terms upon which I will place the country in its former state of quietude and with a refutation of the charges he prefers against me. The terms are those dictated from the first, the surrender for judgment of the murderers of Colonel Canara and the dismissal to their cantonments

of the several corps I have limited him until early to-morrow morning for an answer. Meanwhile as Captain Nicholson writes me that he proposes taking post in Margulla Pass to arrest the march of Peitau Singh's Regiment from Kurreore I have sent him all my mustered troops now available, consisting of 220 Foot and 60 Horse, depending myself upon the Mushwan Levy of peasants, who have arrived to the number of about 300, but who object to employment away from their own mountain. I was most anxious to start myself for that pass, but all my people assure me that it would be mistaken for flight and that the next day I should be without a follower. I fancy I might persuade the corps to return to its duty could I be personally present. I have desired Captain Nicholson not to attempt opposition unless pretty certain of success, as the stake is very great. Indeed I regret that he did not remain just now at Attock, the preservation of which is of the utmost consequence.

In Hurripoor there appears to be a division of feeling. The artillery generally are averse from the mutiny. Colonel Noorooddeen writes that he resisted the march as long as he could, but that he received no answer to his many urzees. I received from him only one and wrote in reply immediately. A force is to be sent up immediately to open the Mahugul Pass for the escape of the Pukli Brigade. But their intentions on the rescue of this Brigade are variously reported. The Brigade, it is said, struck camp a day or two ago and was about to march, when deterred by the Nagarees beating to arms in the mountains and the consequent assurance that the passes were still guarded. I have written Colonel Bhoop Singh that if he will give me any satisfactory assurance that his force will stand fast in cantonments, I will reopen the passes and send them up their pay. I have directed him to communicate with Lieutenant Robinson at Mahugul. I have also issued *Ishtahar namahs* assuring those of the troops returning to their duty of forgiveness.

14th August 1848—Nara—I spent a most anxious night, not being assured of the sufficiency of Captain Nicholson's levy. I find, however, that the Sikh Regiment halted at Jani ke Sungh with purpose to threaten the pass to-morrow, and I hear that Captain Nicholson's levy is swelled to a considerable body. Lieutenant Robinson writes me that he has already about 800 men and expects soon 3,000. The Sirdar has sent no answer to the terms I have insisted upon. This leaves no doubt that he has taken his part finally as a rebel and relieves me of some anxiety lest his present

lawless conduct should have resulted from mere alarm, in which case I should have regretted the promptitude with which I had made my arrangements for coercion. As the Sirdar has command of an army of some 4,000 Regular troops with guns and cavalry movable at an hour a notice and with a rapidity seldom equalled and as my levies require days and even weeks to collect, it is absolutely necessary to lose no time in my arrangements for acting with peasantry against regular troops. Sirdar Chuttur Singh has written it is said, to Colonel Boodh Singh Maun saying, "I raised this mutiny for the family of Maun and you, one of its representatives are false to your own cause and to mine." It will be remembered that two strong efforts were made to shake the loyalty of this fine officer first by a false report of the resumption of his jaghir and secondly by sending a Moonshee to demand 600 rupees said to have been illegally disbursed by him to his troops beyond the Sutlej. Toward evening the post of the 11th came to hand, and I find with much relief that a Commissioner has been appointed to examine and report upon matters in Huzara. This relieves me henceforth of a responsibility most painful. In obedience to the Resident's instructions I have written desiring Captain Nicholson to avoid, if consistent with honor, all collision with the Sikh Regiment, and have ordered Lieutenant Robinson to confine his operations to the destruction of the Gahndia force should it attempt to march.

J ABBOTT CAPTAIN

*Assistant Resident*

*15th August morning* — I have reason to hope that Pertaub Singh's Regiment will return to its cantonments if not in all probability it will be destroyed. I have just taken the evidence of a Sikh soldier who says that Sirdar Chuttur Singh has written Goolah Singh that if he be his son he must carry away Maharaja Dhuleep Singh, that he had given each soldier one rupee as a present and had settled with them to march upon Lahore so soon as the Gahndia (Pukh) Brigade should be free. I have already informed you that he has applied to Jumboo for troops and for a letter to stir up the Peshawur force to mutiny and for another to the Cabul Ruler. This is pretty good proof that he has himself attempted unsuccessfully to create mutiny in Peshawur.

J ABBOTT

**N o 86 —Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 16th August 1848.**

*16th August 1848—Nara, Huzara* —I despatched my diary by yesterday's post, but the fate of the letter bags is very uncertain, as the instant after the murder of Colonel Canara Sirdar Chuttur Singh seized all the post bags and ordered up the troops, his conscience assuring him that his guilt was now manifest. Captain Nicholson rode, I have said, to the Margulla Pass to superintend operations for arresting Pertaub Singh's Corps and guns. Finding his levy strong he did not wait for the mutineers, but marched to their camp at Jani ke Sungh and having hemmed them in allowed them half an hour to decide whether to obey the order of return or to stand his attack. After a very stormy debate discretion prevailed over valor and they returned. The affair was managed with Captain Nicholson's usual skill and decision, and its results promise to be most important. The stake was great, for it was uncertain how soon his levies could be raised, and many of them were not famous for valor. But his own intrepidity seems to have inspired them all and bloodshed has been saved by it, which might have proved the hydra seed (*sic*) of further mischief. Whatever may be the opinion of Government as to my policy, I humbly opine there can be no question that the Government has received in this affair the most important service from Captain Nicholson.

I have as yet no account of Mr Cock's approach. Sirdar Chuttur Singh is so far plunged in rebellion that it might not be prudent to place in his way a hostage for his son at Lahore. Last night Colonel Noorooddeen attempted to execute my orders by marching back three of his guns to their cantonment, but five companies of Boodh Singh's corps seized and detained them. The Sirdar writes politely to me to-day, but avoids answering my two demands,—the surrender of the murderers and the return of the troops mutinously summoned to their cantonments. In Pukli the brigade is in despair. The passes are well guarded under Lieutenant Robinson's supervision. All was quiet in Peshawur by the last account. Captain Nicholson's masterly capture of Attock seems to have damped the zeal of the disaffected. But my news is not very recent. The Resident's orders prevent active operations, otherwise this were the time to destroy the whole of this gang of mutineers, with their murderous leader.

J ABBOTT, CAPTAIN,  
*Assistant Resident*

No 87 —Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 29th August 1848.

29th August 1848—Huzara—As Sirdar Chuttur Singh's force has been close to Margulla and my last posts may have been intercepted I will endeavor to record from memory the transactions of the last four days

When Sirdar Jhundur Singh arrived on deputation from Lahore the case of Sirdar Chuttur Singh was almost hopeless His brigade in Pukh and wing at Nowa Shihr were completely cut off from relief Attock was in our possession the Margulla Pass was closed Pertanb Singh's corps had been turned back by Captain Nicholson and I was about to commence the investment of Hurripoor All his applications for foreign aid had been negatived and he was thinking only how he should leave his army and escape with his son over the mountains but the arrival of Jhundur Singh one of the most wily of intriguers and the best captain in the Sikh service inspired fresh confidence Living in the British camp and believed by Captain Nicholson to be sincere he was master of our weakness of our opinions and of our views I indeed gave him his dismissal to Lahore the second day of his arrival at my camp on his distinctly refusing to attempt the task to which he had pledged himself with the Resident, viz to bring back the troops to their allegiance This task was then apparently easy from the divided state of their feeling and their despair of being joined by the Peshawur Brigades and I was quite satisfied by Sirdar Jhundur Singh's obstinate refusal to make the attempt to recover their allegiance that he had no wish to see this rebellion put down But on his reaching Captain Nicholson's Camp, he put in play all his extraordinary address and frankness of manner and opened to that officer new hopes of settling by negotiation this unhappy affair The delay alone attending his mission was a circumstance most favorable to Sirdar Chuttur Singh's cause I could not cut off the supplies and water of the Hurripoor force so long as negotiations were pending In the midst of these negotiations and whilst Jhundur Singh was flattering Captain Nicholson with hopes that the Sirdar would submit to the terms offered him the Sikh force at Hurripoor made a feint to relieve the Pukh Brigade, and I started across the mountains to gain the Sulbud and Dumtour passes before them There the next day a verbal message

from Captain Nicholson reached me to effect that Chuttur Singh with the whole Hurupoor force had made a dash upon Hussun Ubdal; but had been met and stopt by his own levies on the northern side of the Moti ravine. In an hour my little force was in motion to join Captain Nicholson, and, after a march of 40 miles under a burning sun, came up with the rear of the Sikh camp, which next morning I passed, being prevented molesting them by Captain Nicholson's promise to that effect as negotiations were still pending, Sirdar Chuttur Singh having promised to send his son Sirdar Aotar Singh to Captain Nicholson. Sirdar Chuttur Singh having failed in this his promise, I had on 24th instant Captain Nicholson's consent to advance to the Moti ravine and to cut off the supplies of the Huzara Brigade. I then took an accurate survey of the ravine, which is about 30 feet deep, with many ramifications and considerable shelter for sharpshooters, and my impression was that I could either check the Sikh force there, or inflict upon them at least very serious damage. This I promised Captain Nicholson to attempt, but dissuaded him taking part in the affair as it seemed expedient that he should at present preserve his post to check the approach of Pertaub Singh's Regiment from Rawul Pindi. On advancing to the Moti ravine and choosing a position for my camp in the midst of it, I received a note from Captain Nicholson, mentioning that Sirdar Aotar Singh had that morning waited upon him, that Sirdar Chuttur Singh complained of my having advanced after the departure of his son (whereas it was the sight of my force within a mile of his camp which caused the young Sirdar's departure) and of my having interrupted his supplies. It concluded by saying that he had promised my force should immediately retire and that the supplies should be allowed to reach his camp. I was greatly disheartened by this arrangement, which, had it not been agreed to previously, I would never have consented to. But I withdrew my force according to compact, amid the remonstrance and surprise of all my people, who I perceived lost their confidence in me by this appearance of vacillation. I pitched my tent upon a height in sight of the Sikh camp, and as Captain Nicholson had limited negotiations to the close of that day (the 26th) I observed from time to time with some anxiety the Sikh camp, being assured that treachery was meditated. Accordingly close upon sunset I perceived Sirdar Jhundui Singh returning from a mission to the Sikh



camp and the Sikh camp hustled in preparations for a march. I collected with all possible speed my raw levies scattered over the neighbouring villages and gardens (as having no tents) and marched to meet the Sikhs hoping to be able to throw myself into the Moti ravine ere their heavy guns should have passed it. The Sikhs however, were quite ready to march when first I observed them, and had not above one fourth of the distance which I must traverse to the ravine. My people were fainting with thirst as they religiously observe this Fast. Many were preparing their food, and it was some time before I could get in motion any considerable portion of the 2,000 matchlocks under my command. These I encouraged as they advanced by showing them how ineffective is the fire of artillery in the dark, and never did men march to action in higher spirits or with greater apparent assurance of victory.

The possibility of defending the passage of the Moti ravine is dependent upon previous occupation. If an enemy has time to pass over his advanced guards and get possession of the further bank and there establish his batteries the defence by daylight is hopeless, and even now by night I could hope for little more than to inflict upon the columns such punishment as would be beneficial to our cause hereafter. Twilight was far advanced as I approached the ravine at the head of 100 Horse the Foot straggling behind in spite of every effort to consolidate them. Observing two dark masses which appeared to be elephants and hoping to surprise the guns upon their backs I galloped toward them. Instead of lodging my Horse under the shelter of a village as at first intended, pending the arrival of the Foot. I soon found however, that the two howitzers were in position, their fire raking the whole line of our approach. I therefore drew up the Horse under the shelter first designed for them and returned to collect the Foot which had disappeared in a small ravine as the howitzers opened. This was a work of time. I threw them into the ravine and then following took the lead purposing to return when they were well advanced, to take command of the Horse. I do not think however that of all the 2,100 matchlocks receiving pay or food, above 800 could ever have entered the ravine. Of these not above 20 or 30 could by any means be recovered from their first panic or persuaded to follow me in my repeated attempts to bring them hand to hand with the enemy. Before we could fight our way up to the gun road, the whole of the Sikh force had passed

over and was drawn up in an open plain, the intense darkness rendering it impossible to make out their position. Much ammunition, which I could little spare, was idly expended, and finding there was no hope of bringing the levies hand to hand with the Sikh piquets, I towards morning withdrew the whole force and marched to Captain Nicholson's camp. Here we decided that his position was no longer tenable, Pertaub Singh's Regiment with two guns and 400 levies having made its way through a pass little known. We resolved therefore to march to Hussun Ubdal, examine the ground there, and, if we found its strength sufficient, to make a stand together, and if not, that each should do the best he could in his own region—I to preserve my footing in Huzara and he to preserve Attock. The survey of the Hussun Ubdal rocks gave us no confidence in being able to hold that place above one day against 4 Sikh regiments, 400 irregulars and 8 guns, and it seemed far better that both our forces should retire from it with unsullied arms than risk the probable chance of a defeat upon ground where our levies could not fight to the greatest advantage and where our cavalry could not act.

In pursuance of this resolution, I marched on the morning of 28th for Kote Nujjeeboolla, not however before Captain Nicholson and myself had once agreed to dismiss Sirdar Jhundur Singh, the author of all our present difficulties, I having signed and sealed his letter of dismissal and Captain Nicholson having relented and, to my exceeding sorrow, suffered him to linger in his camp, a circumstance from which I augur the worst results to our cause.

Sirdar Jhundur Singh having produced a letter purporting to be from Sirdar Goolab Singh urging that Sirdar Aotar Singh should be sent to Lahore, both Captain Nicholson and myself thought the motion advisable and, with full consent of the young Sirdar, sent him on his way. He, however, either voluntarily joined his father or was waylaid by him on the road. In either case there can be little doubt that Jhundur Singh either devised or conducted this fresh act of treachery. I am encamped near the Fort of Hurkishengurh, which will be invested to-morrow.

I need not, I think, advert to the opinion I expressed on first learning that Sirdar Jhundur Singh had been sent to settle the Sikh army in Huzara. Either I am gifted with prophecy or my estimate of Sikh

character and intrigue is correct. In the latter case I earnestly beg the consideration of Government to the state of our affairs brought about by the mission of Sirdar Jhundur Singh and the urgent necessity of measures which previous to his arrival I hoped would not be required.

J ABBOTT, CAPTAIN

*Assistant Resident*

**No 88 — Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 4th September 1848**

*4th September 1848—Camp Nara, Huzara* — The active duties in which I have been engaged have inevitably led to irregularity in my Journal. But only one day has passed without a note from my pen addressed to the Residency at Lahore. No post has been received from Lahore during the last three days Chuttur Singh having contrived to cut off the daks. When Captain Nicholson and myself had determined not to make a stand at Hussun Ubdal, I retired to Huzara, and on the march of the Sikh force for Hussun Ubdal Captain Nicholson moved upon Attock, the Sikh army following. But on the 2nd Chuttur Singh, finding perhaps no hope of support from Peshawur turned back and re-occupied Hussun Ubdal and yesterday retired about four miles toward Margulla Pass. Captain Nicholson's army followed and took post at Sooltanpoor about eight miles distant, a station on the flank of any advance of the Sikh force towards Huzara. Such was the posture of affairs last night. The Pukli Brigade was still at Mansera, afraid to advance the passes being closely watched under the supervision of Lieutenant Robinson. Still, were the people of Huzara wholly devoted to a work which is far more for their benefit than for that of any third party the Pukli force must long since have surrendered or attempted to force the passes. Begirt as they are with armed levies, not an ounce of food should find its way to their camp. The report in the Sikh camp states that the Sirdar wants only the junction of the Pukli Brigade to march upon Lahore. I have frequently expressed my opinion that since the unfortunate result of Jbundur Singh's treachery, matters cannot be settled in this region without aid of a British force and that not a regiment should be withdrawn from Lahore for this purpose.

J ABBOTT, CAPTAIN,

*Assistant Resident.*

**No 89 —Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 6th September 1848.**

*6th September 1848 —Camp Nara, Huzara.* — I despatched my Journal of yesterday by a bypath to the Post Office at Rawul Pindi, but to-day I hear that Chuttur Singh arrests the post bag at Bukralla, and for four days no letter has reached me from Lahore. It is therefore necessary to find some other line of dak. Sirdar Chuttur Singh having marched as far as Huz100, apparently to besiege Attock, turned back suddenly from thence and reoccupied Hussun Ubdal, which he again quitted as Captain Nicholson's force arrived in the neighbourhood. Chuttur Singh took post at Banbera, five miles eastward of Hussun Ubdal, and sent Aotai Singh (his son) with 600 foot, some guns and horse to force Margulla Pass, which seems to have been accomplished with little opposition. Aotai Singh went on to Rawul Pindi, where the bulk of Sirdar Goolab Singh Poovindia's horse have, I imagine, joined him. His detachment returned to Banbera, and Chuttur Singh having lodged his heavy baggage at Kala ke Seraie apparently meditates a return to Huzara to free his detachments from the passes. He has, however, I hear made a march onward to Kala ke Seraie to-day. Captain Nicholson, whose vigilance is incessant, turned his flank by a night march to Koorum in the Khaunpooi mountains, which has probably led to this advance of Chuttur Singh's force. It seems impossible that he should leave the Pukli Brigade in limbo. Lieutenant Robinson continues to guard the upper passes, and I am endeavouring to raise levies to act with either. I supposed it quite certain that Chuttur Singh would be employed for some time before Attock, and ad opus Robinsoni totum exercitum misi. I have several times expressed an opinion that since the treachery of Sirdar Jhundur Singh a British force will be necessary to quell this rebellion and that not a regiment should be drawn for the purpose from Lahore.

J. ABBOTT, CAPTAIN,  
*Assistant Resident*

**No. 90 —Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 6th September 1848.**

*6th September 1848 —Nara, Huzara* —Yesterday Captain Nicholson attacked the bastion which guards the Margulla Pass with his usual

gallantry He was, however, unprovided with scaling ladders and guns, and, Sirdar Chuttur Singh bringing up his whole force to the rescue retired with the loss of about six men killed and several wounded The attempt was bold but too hazardous Were the Sikh force withdrawn the bastion might be forced without much difficulty But men defended by walls do not lose heart whilst aid is within sight Captain Nicholson was wounded slightly with a stone Colonel Boodb Singh was more severely injured by a similar missile Captain Nicholson continues at Koorum in the Khaunpoor mountains and Chuttur Singh's force is at Kala Seraic The attack has had the happy effect of diverting the Sikhs from their purpose of succouring the Gahndia (Pukh) Brigade which remains at Mansera It is difficult to make out the views of Chuttur Singh some say he wishes to march to Baug Bootur but it is more probable that he will attempt to raise force enough to make his way to Lahore or to Mooltan Our daks have been intercepted the last week it is said at Bukrala, and we are endeavouring to establish a dak *via* Pind Dadun Khan I long ago noticed the importance of having the daks independent so far as possible, of Native supervision and pointed out the importance of establishing an agency in Goojrat Had the Potowar and Goojrat agencies been in operation this rebellion had either never broken out or had been put down in a few days I should argue from the movements of the rebel force that Jhundur Singh's influence is still felt and that he is not far off but I have no tidings of his movements I trust the families of the rebels have been arrested and that the so often urged precaution of mastering the river Jelum has not been neglected

J ABBOTT, CAPTAIN,

*Assistant Resident*

I beg to recommend with all deference that no troops be withdrawn from Lahore for the force here requisite

*P.S. — 13th September* — This was accidentally left at Nara when I proceeded to Dumtour, no arrangement having then been made for our daks

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No 91 — Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 7th September 1848.

*7th September 1848 — Nara, Huzara* — Our daks have been completely cut off for many days I therefore am obliged to try the route by Pind

Dadun Khan. I hear that Chuttur Singh, having burnt the tower at Margulla and placed all his baggage with one regiment in the Kala Seraie, has marched to-day in this direction with the bulk of his brigade lightly equipped, in order to open the passes to the Pukli Brigade. I am making the best arrangements in my power to meet this movement. It would give my patrians great confidence to hear that a British force had marched toward Huzara; for it seems no longer an easy matter to cope with the forces collected together without such assistance. The people of Pukli and Duntou have been bought over to Sikh interests, and with a divided people and without aid of guns it is hard to encounter regular troops in the plain. I have with my armed peasantry arrested for five weeks the march of a brigade of regular troops mustering 800 bayonets, 200 cavalry, 4 guns and 20 zumboorahs, and thus in spite of low funds and insuperable difficulty in obtaining ammunition. This respite must I humbly opine have afforded leisure to the Government to meet the armed irruption with a suitable force and with promptitude, and I trust that it is owing solely to the arrest of our daks that I am not advised of the march of succour. The forts of Forbaila, Barookote and Ghazi of Mari, Chujia and Khaunpoo have surrendered to me after short sieges others are invested. It is not my wish to disturb the garrisons of any but commanding posts, provided they profess loyalty, but the possession of the plain by a Sikh army with guns renders the possession of certain forts by my garrisons essentially necessary to security. The Fort of Syudpoor belonging to Chuttur Singh was besieged and reduced without my knowledge. It is just as well that the mistake was made.

J ABBOTT, CAPTAIN,  
Assistant Resident

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No. 92—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, from the 7th to the 13th September 1848.

7th September 1848—Nara, Huzara.—Chuttur Singh having deposited his baggage and heavy guns in Kala Seraie, and taking with him four regiments, six guns, some horse, say 600, and a considerable body of Sebundies, marched from the Seraie in a single march of about 25 miles to Hurripoor. I heard of his intention to march, but not until he was actually on his way. I made preparations to dispute the passage of the

Moti ravine, although the lightness of his present equipment rendered it a very hazardous experiment but before my levies were collected we saw the head of his column several miles on the hither side.

*8th September 1848—Nara*—Captain Nicholson on learning the march of Chuttur Singh started in pursuit and passed him during the night, by a most extraordinary march of some 35 miles, and I shall march instantly up to the Sulhud Pass, as I see the Sikh force is again on the move upwards

*9th September—Sulhud*—I marched this day to Sulhud and found both that Pass and the Dumtour Pass wholly undefended, at least there were not above 50 men at Sulhud, where 700 or 800 are necessary, and not a fighting man at Dumtour, Hussun Ali Khan, Kurral having in spite of stringent orders withdrawn his levies. I posted 700 men in Sulhud and proceeded to Dumtour to make arrangements there. Captain Nicholson came in with his force of 900 matchlocks and 300 cavalry whilst I was at Dumtour and we had a consultation with the persons best acquainted with the country. The opinion of every man of rank in Captain Nicholson's force is that they cannot hold so extended a line of defences with 1100 matchlocks, our utmost array. This too being Captain Nicholson's opinion I have counselled him not to attempt it but to fall back at once and allow the enemy to pass. This night, however, I received his final resolution, viz. that finding his people in better heart, upon the assurance that I would check a sally upon their rear of the Nowa Shibr garrison of 400 bayonets, and would co-operate with them upon the enemy's flank, he had finally decided upon making a stand. I confess I regret this resolution, which is one of self sacrifice, because it is contrary to his own opinion, and because my power of resisting with two or three hundred matchlocks the sally of 400 bayonets, is something more than doubtful.

*10th September—Sulhud*—Early this morning, finding that the Sikh camp was breaking up I collected all the defenders of the Sulhud Pass, 700 in number and marching after the Sikh army overtook it at Rujjoola about six miles from Dumtour. The Sikhs halted and encamped at Rujjoola, and I pushed on to Dumtour and joined Captain Nicholson. As they cannot attack us to-day I am apprehensive that they may turn back to the Sulhud Pass which I have left undefended. I have therefore sent 400 matchlocks thither. We have now all three portions of an

army of 4,000 men, with 10 guns and 40 zumbooras, in close proximity severed only by our own irregular troops. Whether these, inferior in number to the regulars and unprovided with artillery, will be persuaded to stand, remains to be seen. The risk is very great, and the consequences of failure may be most disastrous.

*11th September 1848—Dumtour*—The Sikh camp was under arms at a very early hour, and we turned out our levies an hour before dawn. But owing to the slowness and want of prompt obedience of these people (I cannot call them soldiers), my own levies which were not in position (having arrived last afternoon, starving and exhausted from their long and burning march) were late in getting into place, and I was detained in performing the office of Quarter-master, as the only person whom they will obey. When I had made my way to the front I perceived that a body of irregulars was pushing towards a path leading over the high mountain of Sirboon, to the head of the Sulhud Pass. Fearing it was still their design to seize that pass, I ordered fifty matchlocks to take possession of a village half way up. But there is no possibility of getting an order carried out by raw levies, and when every other attempt had failed, I got them forward by leading them on and, when well separated from their companions, pushing them forward. I was then retiring to the main body, when the people of Futteh Khan, Ghaybie, who occupied a spur of the Sirboon mountain in advance, cried out to me that if I retired they would all fly. They were so evidently in earnest, and the importance of preventing their flight was so urgent that in spite of the importance of being with the main force, I felt compelled to remain, being assured that their retreat would be a signal for the flight of the whole army. I therefore took post with my 20 remaining followers upon another spur of the Sirboon mountain. The Sikh army was now within short cannon shot. They opened their fire upon the spurs occupied by myself and Futteh Khan, and I imagine from the number of cannon shot passing over my head that they must have distinguished my person, perhaps by means of my red-coated orderlies. I looked at a high hill opposite the foremost of our barriers, Captain Nicholson had planted 200 Peshawuries there. The hill was now quite naked, the men must have been bribed to desert during the night. Captain Nicholson, seeing that a body of 1,000 Sikhs was rushing toward that hill, carried up about 50 men to strengthen it; he could



urge them forward only by presenting his pistol at their heads successively. On reaching the summit, he was in despair to find it wholly deserted, whilst the Sikh column had nearly gained the brow. He retired to make further arrangements at other posts. The small party thus left behaved very well. They did not fly until the Sikhs were within ten paces of them, and their escape had become very precarious. Their flight was a signal for the flight of our entire force, most of whom had not even seen the enemy. They occupied the strong ground where we purposed making our stand when the advanced posts should become untenable. The Sikhs were 3,000 strong with six guns and 20 *zums* *booras*. Their cavalry was principally dismounted, their arrangements were all good but had the 200 *Peshawaries* not proved faithless the column would almost certainly have been checked. Our force amounted to about 1,400 matchlocks, scattered over an immense extent of ground, requiring at least five or six thousand men to defend it properly.

I was completely cut off by the advance of the enemy and with much difficulty made my way to the spot where Captain Nicholson with his cavalry was covering the retreat. Long before I could reach him, the whole of our infantry had passed in their shameful flight.

It is manifest that with such materials nothing but dishonor can be expected to the British name. Had the men fought and been beaten, we might have fought again with hope of better fortune. But I have now tried them twice and met with the most dastardly conduct on both occasions. Captain Nicholson's experience agrees with my own. They will not follow us into danger. They will not wait to see the face of an enemy. I had previously directed Lieutenant Robinson to be ready to withdraw and disperse his levies in case of our defeat which from the first seemed too probable. We retreated by the Sulbud Pass and I sent 400 matchlocks to keep open the Khahl Baug Pass for Lieutenant Robinson.

*12th September 1848—Nara*—Captain Nicholson separated from me to return to his own district. I marched to Nara. I have received a note from Sir Frederick Currie which is the first news from Lahore for 10 or 12 days. From this I cannot learn that any force has been or is to be sent in this direction and I know not how this rebellion is to be otherwise quelled. Lieutenant Robinson joined me without difficulty to-day.

13th September 1848—*Nara, forenoon.*—The heavy rain of last night has probably detained the Sikh army at Nowa Shih. Raja Deena Nath has arrived, it is said, at Rawul Pindi.

J. ABBOTT. CAPTAIN,  
*Assistant Resident.*

**No 93 – Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 13th and 14th September 1848.**

13th September 1848—*Nara, Huzara.*—I have recorded in my previous diary the success of Chuttur Singh in forcing the Dumtour Pass, owing to the cowardice, and it is to be feared treachery, of our levies, who, excepting about 150, fled without waiting to see the enemy and left us to our fate. I have mentioned that Captain Nicholson returned to his own district, and that I returned to Nara to see whether the people of Huzara were disposed to maintain the contest with any vigor. I learn to-day that the people of the upper districts have generally made their submission to Chuttur Singh, and I perceive that Jehandad Khan and Goolam Khan are anxious to follow their example. A single tribe alone can be depended upon not to betray me. Captain Nicholson writes me, and I hear from several other persons, that Maharaja Goolab Singh has actually given the regiments \* which Chuttur Singh wrote for to my knowledge, and that they have reached Rawul Pindi with four guns and are to advance in this direction. Raja Deena Nath is said also to have been some days at Rawul Pindi, but he has communicated neither with me nor with Captain Nicholson. It is reported that Sirdar Mhatab Singh and Sirdar Gooludut Singh, after all their professions of loyalty, contrived to have their persons seized by Aotar Singh.

14th September—*Nara*—Chuttur Singh appears to have been detained at Nowa Shih in reopening the roads and in calling in the people. I on my part have been anxiously consulting those whose fidelity can be relied on as to the chance of being supported in my footing here against the army of Chuttur Singh, and what is worse against the effects of bribery and treachery combined. The arguments of the most sanguine afford λιττλε ωπε of such Συππορτ.

There is a report that Chuttur Singh expects the Peshawur force to join him at Torbaila, and has arranged with Syud Ukbur for their

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\* These regiments are of course declared to be mutinous.

reception there. If this be true his object is to overwhelm me with numbers. All was quiet by the last news from Peshawur. But the disaster at Dumtour was not then known. I trust no hope has been built upon the mediation of Raja Deena Nath. If he had the will, he has not the power to effect any arrangement consistent with the dignity of the Government.

J ABBOTT CAPTAIN,  
*Assistant Resident*

It does not seem certain that Chuttur Singh will immediately advance. It is possible that he may retain Huzara until his cause is strengthened by the delay of our force.

A private note accompanies.

No 94.—Diary of Captain James Abbott, Assistant Resident on deputation to Huzara, for the 16th September 1848

16th September 1848—Nara, Huzara—Our posts have come in regularly for some days past. But a new line may be necessary when Chuttur Singh moves to the south-east. The report that Chuttur Singh has bribed Syed Ukbur Shah to bring over the ferries of the Indus the Peshawur troops on their march, is so strong as to amount almost to certainty. I cannot distinctly ascertain how many of those troops are expected to mutiny. Chuttur Singh will return toward Huzara to-day I imagine and probably be here to-morrow. His design seems to be to assemble his force upon the Indus, and march to Lahore from thence. But he will probably first make a strenuous effort to capture the British officers in Huzara.

J ABBOTT, CAPTAIN,  
*Assistant Resident.*

No 95.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, from the 17th to the 19th September 1848

17th, 18th 19th September 1848—Nara Huzara—I have already related that after the shameful flight of our troops at Dumtour, Captain Nicholson and myself returned toward Hurripoor and separated, he for his own district and I for Nara according to agreement. At Nara, if anywhere, I may hope to be supported by the mountaineers in a stand

against the Sikh army. If they attack me, and my people stand, Chuttur Singh will in all probability be defeated with great slaughter, and his cause will fall to the ground. If he do not attack me, on his quitting Huzara he will leave me in possession of the district, which I imagine the Government must wish me to retain. The only persons who have gone in to the Sikhs are those zumeendars and Mulliks of villages of the plains who have scarcely an option. The whole people consider themselves especially under the protection of the British Government. They will not indeed back me in any military enterprize with the heartiness necessary to success, but they hate and dread the Sikh dominion. Were I to evacuate the country, the whole Punjaub would be affected by the movement. I have therefore sent Lieutenant Robinson to the upper districts to resume charge of them, so that if any accident befall me, our authority in Huzara may not be lost. The Sikh army apparently meditates an attack upon Attock from both sides of the river, if it fail to secure a passage higher up. My presence here has, I trust, enabled me to put serious obstacles in the way of the latter design. Twenty-four of the guns at Peshawur are said to be gained over. I trust this is not the case. But Chuttur Singh's chief reliance is upon having, through his son Goolab Singh, successfully tampered with the Native regiments at Lahore. I most earnestly beg attention to this subject. It seems scarcely credible that Chuttur Singh should venture upon such an expedition with so small an army, unless he had grounds for this hope. A letter came from Goolab Singh (his son) a few days ago urging him to hasten to Lahore, for that several of our Native regiments there were his. The letter was secured in the sole of the bearer's shoe. Maharaja Goolab Singh has paid as yet no attention to the Resident's request that he would advance me 30,000 rupees. But the request of Sirdar Chuttur Singh that he would send him certain regiments has been promptly complied with, according to my best intelligence, two corps, said to have mutinied, having come to the Sirdar's aid. Although I hope the report of our Native regiments at Lahore is untrue, yet the stake is so great that I would venture to suggest their being, if possible, so disposed of as to prevent the ill-consequences which their defection must occasion. Raja Deena Nath has communicated with Sirdar Chuttur Singh, but not with Captain Nicholson nor with me. He is raising troops at Chukkowal, who will of course join the insurgents.

A great effort was made by Chuttur Singh to bribe the Juddoons about Khubbul &c. to give the Peshawur force free passage. I trust that my influence will prove sufficient to foil him here; and if so it seems to be his purpose to attack Attock on the eastern side of the Indus, whilst the Peshawur mutineers attack it on the west, and if successful the whole force will march at once upon Lahore. I should fear that Chuttur Singh must have received pecuniary aid from Maharaja Goolah Singh or he would be unable to keep together his army, all the treasuries in this neighbourhood being dry.

J ABBOTT CAPTAIN,  
*Assistant Resident*

The last two or three days in place of a Journal I have answered the Resident's notes.

Received to-day a Roobakaree from the Residency announcing some advantage gained over Moolraj by General Whish's force.

There is every reason to believe that the agent of Sirdar Goolab Singh (son of Chuttur Singh) used all his influence with the Hurripoor troops to persuade them to persist in their rebellion stating that the Native Corps at Lahore were rotten that there were only five Corps there and that the British were sending away, in alarm their wives and baggage.

J ABBOTT

No 96.—Diary of Captain James Abbott to Lahore from thence. seems to  
dent, on deputation to Huzara, for his effort to capture  
September 1848.

20th and 21st September 1848.—Nara Hutt, CAPTAIN,  
movements have been less rapid than was anticipated. Assistant Resident.  
of six regiments of infantry 600 horse, 18 guns  
about 1000 matchlocks arrived on 20th, and en. Assistant Res.  
They were busied all day with preparations for a march the 17th to the  
report says that if on reaching Hissun Ubdal or H.  
Sikh force at Peshawur on the move that then they will—I have already  
attack Attock from both sides of the river that if Dumtour, Captain  
Peshawur force they will march at once upon Lahore and separated, he  
of the 19th Chuttur Singh fired a salute some sayment. At Nara,  
Serjeant Denton, drowned in a captured boat off Attock. In a stand

was in honor of two despatches, the one from Cashmere assuring the Sirdar that 40,000 rupees had been despatched to him and that the Jumboo army should march on his reaching Jelum, the other from Mooltan informing him of a great victory to the united arms of Raja Shere Singh and Moolraj. Chuttur Singh is halted still on the 21st at Hurripoor. Should he attack Nara, I have good hope that my people will stand, in which case I trust to break the neck of this rebellion. It is a season of much anxiety to me, as treachery is around my camp, and I have twice been deserted in the conflict by my men. I do not think there is much fear of the Peshawur force effecting a passage above Attock.

J ABBOTT, CAPTAIN,  
*Assistant Resident*

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**No 97.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 22nd and 23rd September 1848**

*22nd September 1848—Nara, Huzara*—Chuttur Singh's camp is still halted at Hurripoor within sight of my position, which is the foot of the Gundgurb mountain. We expected to be attacked last night or this morning and were on the *qui vive*. I trust my people will fulfil their solemn promise of standing manfully, in which case I trust to inflict upon the Sirdar a blow which will not be easily recovered. He has six regiments, about 600 horse, 1,000 matchlocks, and 11 guns and 40 zumbooras. A couple of British regiments with three guns and 200 horse would, I doubt not, rout them all. Had I a single regiment here to lead the way my people would probably follow. But they have no confidence in the plain against guns and cavalry.

*23rd September—Nara*.—Chuttur Singh remains halted at Hurripoor. Last night we were again on the alert. He made an unsuccessful effort to relieve the Sherwaun garrison, his party being driven back by the Tunnoles. A party of his son, Aotai Singh, sent against Syudpoor were defeated a day or two ago. The head of their leader has just been brought me. I have ordered that it be burnt after Sikh usage instead of suspending it as my people wish. We were not with the widow and fatherless. Numbers of the people of the plain from fear of the Sikhs or from jealousy of my adherents have been aiding the Sirdar. This is

what I have chiefly to apprehend. They have means and knowledge highly valuable to the enemy. But for this I should have little apprehension. I destroyed another boat to-day with infinite difficulty. I hope I have succeeded with another. The independent tribes on the Indus are extremely jealous of their boats, and Chuttur Singh has been bribing royally to obtain them for his own or the Peshawur force. I read with much concern of the resolution of General Whish. I supposed that every one was prepared to see Raja Shere Singh take a step confidently expected of him by the Sikh army in Huzara from the outset.

J ABBOTT, CAPTAIN

*Assistant Resident.*

P S—A letter just received *φρον μααραφα γυλαβ σιργ νοτεσ θη δεσπαρχ το μη σφ ρυπησ XXVMI*. When it reaches me I shall be better able to appreciate the loan.

**No 98—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 24th September 1848**

*24th September 1848—Nara Huzara.*—We have been on the alert for the last three nights in expectation of an attack, and Chuttur Singh, it is said, speaks confidently of attacking my position to-morrow or the next day. When I returned from the shameful affair at Duntour, I assembled the people of the Gundgurb mountain, and after reminding them that my presence in Huzara was solely for their protection, and assuring them I would not remain an hour longer than they desired, put it to them whether I should make my seat here or retire to some other place. One and all implored me to remain. I replied that I would not remain to be dishonored a third time by the cowardice of my followers, that if I staid and exposed my life for them I expected them to stand by me to the death. They all solemnly vowed they would do so and I consented to remain. This mountain is a haunted spot. It has been carried but once and then by an overwhelming army and the aid of treachery. Could we be sure that treachery will not aid the intended assault, we might be pretty confident of successful resistance, for the people have their wives and families here. I think I should be wrong to forfeit the chance for if defeated Chuttur Singh's cause is lost. If I fail, the loss to my country is one individual, the least worthy of her sons.

I have destroyed I trust another boat upon the Indus. There is a good deal of dissatisfaction in the Sikh camp, which is in sight

J ABBOTT, CAPTAIN,  
*Assistant Resident*

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**No 99** — Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 25th and 26th September 1848.

*25th September 1848—Nara, Huzara.*—The camp of Chuttur Singh remains at Hurripoor for the Sradh. Reports vary every hour. There has been great difficulty in providing a garrison for Hurkishengurh. No one will willingly remain in the assurance of being besieged the instant his force marches. In this dilemma the Sirdar summoned the punchayut, and explaining the difficulty put it to them whether they could quit Huzara without attacking my position. The resolution seems to have been in favor of an attack and we have been on the alert in consequence. But nothing certain is known.

*26th September—Nara* —Bad news from Lahore or Mooltan is said to have reached Chuttur Singh. His troops are reported to be much divided by dissensions, and disgusted by the want of pay. The Peshawur force, I believe, shows no great readiness to move. It may be doubted whether they will move unless he take Attock, or whether he would venture to attack that fort without aid from Peshawur. Aotar Singh's levies have been shamefully defeated by a handful of Gukhas. It is said that the letters urging him to march upon Lahore have been succeeded by others informing him that that move is now too late, owing to the large number of British troops arrived and arriving there; and counselling him to take post at Karoo Khowta, and there raise revenue for his maintenance. All my property left at Hurripoor, and that of Lieutenant Robinson, was plundered by the Sikhs a day or two ago. Two of my bungalows they had previously destroyed, some Government instruments have I fear been seized. The camp is still at Hurripoor.

J. ABBOTT, CAPTAIN,  
*Assistant Resident.*



No 100 —Diary of Captain James Abbott, Agent, on deputation to Huzara, for the 22 September 1848.

27th September 1848—Huzara —The camp of C not moved to-day, but remains at Hurripoor. Of two at Khubbul one was seized and taken to Attock by a son of For the destruction of the second I paid about 500 rup but instead of breaking up or burning the boat accord r they merely sunk it. Syud Ukhur of Sythana fished Sirdar Chuttur Singh, but I rather hope the Khub from his clutches. I am doing my best to destroy it. is positively to march to-morrow some say in this direct it will move on Chuch

I deeply regret to have to record a most lament under this date. The garrisons of three neighbouring mitted to me, and had received certain advances of pay upon the Chuch Kardar for two months more, and from the payment of all arrears when the country should be condition of their not taking service with Chuttur Singh after the most solemn promises of compliance went over to the enemy. The circumstance caused great indignity camp. The garrison of Sherwaun being proved to be in enence with Chuttur Singh it was necessary to relieve it, and it accordingly to Nara. Ten or twelve of the men were deserting from thence when I heard of it, and sent a them. In an instant the report of treachery circulated camp and that I had ordered the garrison to be plundered. disciplined levies fell upon the unfortunate men who their food or otherwise engaged and they were stripped and property which were carried up into the mountain mercilessly cut down apparently unresisting. The confusion that my presence could not for a long time appease it, and to recover property have proved hitherto but partially. The men having no barracks, camp nor lines, but occupying mountains. This melancholy affair has oppressed me with painful and anxious thought and proved in an impressive misery of commanding an armed force which will not follow

danger, but is ready at a moment's notice to wreak its vengeance upon the helpless and unoffending. The men were not Sikhs but Hindoos of all castes.

28th September 1848—*Nara*—Chuttur Singh, after destroying my bungalow at Hurripoor, marched this morning half a *koss* upon the Hussun or Margulla road, and is encamped there in sight. Report speaks variously of his immediate designs, some saying that he will attack my position and others that he will continue his march. His halt after one mile of march appears to argue the receipt of unexpected intelligence after having started. But as yet I have no other authority for this supposition.

J ABBOTT, CAPTAIN,  
Assistant Resident

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**No 101.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 29th September 1848.**

29th September 1848—*Nara, Huzara*—Chuttur Singh marched with his whole force this morning about nine miles in a southerly direction, intending, it is believed, to proceed to Chuch, and thence perhaps to Attock. A good deal of dissension prevails in his camp. The report all yesterday of his intention to attack my position was strong, and we were all on the alert, until his columns were seen fairly progressing southwards. As he could not make up his mind to attack my 1,000 matchlocks, with his six regiments, cavalry, and guns, he vented his spleen upon my bungalow at Hurripoor, the third which the Sikh soldiery have destroyed. Intercepted a letter this morning, from Khan-i-Zeman Khan of Gundgurb to Chuttur Singh referring to intrigues of the latter long previous to this outbreak, urging him to attack Attock without delay and promising him, so soon as the Peshawur force should join Chuttur Singh, to kill me, and to place Huzara in his power. This Khan-i-Zeman Khan is the chief whom I restored to his long-forfeited patrimony. The letter is valuable as another proof that Chuttur Singh was intriguing with the chiefs of Huzara previous to the outbreak. Report says that Fattah Khan of Ghayb, who was in like manner restored to his lost patrimony by Captain Nicholson, has made to Chuttur Singh a similar promise respecting that officer's life. Such are the men for and with whom we are fighting.

Chuttur Singh, previous to his march this day assembled the zumeendars of the neighbourhood and told them on no account to pay any revenue to me, on pain of his displeasure saying "I march now upon Attock which I shall attack and take, and carry over the Peshawur force in boats and if I fail to take it I will waft over the Peshawur army upon rafts of inflated skins. In any case I will bring them over and when they are over, I will attack and take Gundgurb and Srikote. I will on no account march southward, until I have settled the Gundgurb mountain." The people whom he ordered to garrison the Fort of Hurkishengurb fled from it yesterday, the instant he marched which it is said was the cause of so small a stage (one mile).

J ABBOTT CAPTAIN,  
*Assistant Resident*

No 102.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, from the 1st to the 4th October 1848.

1st and 2nd October 1848.—Nara, Huzara.—Sirdar Chuttur Singh is with his whole force at Banbera separating the baggage, which is to be left at Kala Seraic. He is then to return to Chuch, or to invest Attock. There are reports in his camp confidently believed, that the guards of the land gate have promised him admittance. I have written to warn Mr Herbert and to suggest that the gate be built up at once and as other reports attribute treachery to his golundauze I have suggested that a staunch guard be posted at each gun, apparently for the protection of the ramparts but really to prevent treachery, and to see that the golundauze do not fire wide. Chuttur Singh, unless joined by the Peshawur force, will not I think cross the Jelum. His friends in Lahore tell him it is too late according to my best information, and he is evidently preparing to hold possession of this Doab by the arrangements he is making for retaining forts, appointing tehseldars etc. He purposes holding Huzara, although the revenue is so trifling. Should the Peshawur force join, it is impossible to say where the *punches* may direct the army, very probably upon Mooltan. The resolution of the officer commanding there to raise the siege, without even attempting with his powerful train to gain possession of the city, must of course greatly

prejudice our cause throughout the Punjaub; and here especially where our power has hitherto been so respected. With possession of the city of Mooltan we could have prolonged the preliminaries of the siege of the fortress, without any symptom of weakness, and until succour should have arrived. And it is impossible to imagine that any town wall, however well defended, could long resist the attack of two British brigades, with a powerful siege train, supported by 18,000 brave allies.

It is important that the rebellion in this Dooab should be speedily put down, or it may spread to other parts. The difficulty with the insurgents is their want of treasure. But if allowed peaceful possession, they will collect the whole revenue of these districts. The first instalment of this season is just due, and whatever they collect is deducted from our Treasury. Our adherents are disheartened at being left two months to struggle against a regular army, without even the prospect of succour, and more importance attaches just now to the possession of Huzara than may at first sight appear.

*3rd October 1848—Nara* — Chuttur Singh marched with his force, including his battering guns, to Puthurgurh close to Hussun Ubdal, where he is making collections, destroying the crops of those who refuse to pay and burning, it is said, their houses. The disposition to resist payment is general, and many have fled. But they are without prospect of support, and will, I suppose, all eventually submit.

*4th October—Nara* — My news from the Sikh camp is not yet in. There appears to be no doubt that it is moving either upon Attock or upon the Nilab Ferry. I earnestly hope the boats have been secured at the latter. I was not aware that there was a practicable route to Peshawur *via* Nilab, and therefore have never enquired. But I presume this must be known to the officers in charge of Peshawur, and Sinde Sagar. Lieutenant Herbert assures me the gateway shall be immediately built up.

J. ABBOTT, CAPTAIN,  
*Assistant Resident*

No 103 —Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 5th and 6th October 1848.

*5th October 1848—Nara, Huzara*—Chuttur Singh appears to be marching steadily upon Attock invited say his men by the officers in charge of one of the gates who have promised to open to him. I have recommended Lieutenant Herbert to have the inner cavity of the land gate built up with dry masonry to the depth of 10 or 12 feet, and to exclude from the fortress every Sikh whatever, planting guards also near the several guns. Nevertheless I feel uneasy about the fate of a fort upon which so great a stake is hazarded. No Lahore dak has reached me for several days, owing perhaps to Captain Nicholson's eccentric movement.

*6th October—Nara*—Late in the night the Lahore post of the—came in bringing me from Mr Inglis some particulars of our force at Mooltan. I believe a single brigade has been sent to strengthen it. If two British brigades with 20,000 allies and a battering train are insufficient to carry a simple gothic wall without outworks or ditch and of no considerable altitude, it appears to me very doubtful whether three brigades will suffice to storm a fortress of such acknowledged strength as that of Mooltan especially as the mortars of the siege train are manifestly insufficient for the work in hand. I hazard this opinion in the hope of being useful. I thought two brigades too small a force to isolate at Mooltan with the assurance I have long possessed that Sher Singh's force would sooner or later join the enemy. But I never conjectured that a town wall would have arrested two brigades and 20,000 brave allies. The moral effect of this arrest will I fear prove disastrous. The news found Chuttur Singh's army disheartened and divided, and in some danger of falling to pieces. It was celebrated as a victory, restored their union and their confidence, and so dispirited our party here, that I have since heard of nothing but secret offers of my partizans to join the enemy. Of course its effect at Peshawur must be in proportion, all which had been saved, and a sensible blow had besides been struck, had the city been carried at once by the combined armies.

With regard to the Sikh army westward of the Jelum, the union of the Peshawur force with Chuttur Singh's must be regarded as a

strong probability. The existence of the latter force depends upon this union, and they will effect it if within the limits of the possible. What may be the movement of the united force cannot be determined. It may remain westward of the Jelum collecting the revenue of Potowar and Peshawur, or it may be hurled at Lahore or at Mooltan. If, then, the Mooltan force were strengthened by two more brigades from Bombay, and the Lahore force were at once to advance before the Sikh army had had time to make extensive collections (cash being the chief want of Chuttur Singh), or to establish a settled government of its own in these parts, the whole insurrection might be easily swept down. If time is permitted to pass away unimproved by our advance (and already the insurgents have been two months in the field) the strength of the rebels may go on increasing daily, as heretofore, until it became really formidable. Chuttur Singh's present system is evidently to conquer and keep possession of as much country as possible of this Dooab and to exclude the British from it. He himself has no idea of advancing upon Lahore although a Sikh Panchayat might produce such a movement.

I would above all advert to the necessity of securing the collections of all rich tracts by multiplying British agents, each with a couple of hundred horse and as many matchlocks, in all districts unoccupied by the enemy.

The people of the country are all our friends, excepting of course in Sikh districts, which are very rare, and where they have the choice will always pay to British authority. The expense of this is not worthy of consideration, the great object being to deprive the enemy of the sinews of war and to render it impossible for him to collect without dividing his force *ad infinitum*. Our communications would thus be kept open, and a correspondence maintained with the people which may be of the greatest advantage.

J ABBOTT, CAPTAIN,  
*Assistant Resident*

Our reports speak of the steady advance of Chuttur Singh's force upon Attock.

No 104.—Diary of Captain James Abbott Assistant Resident, on deputation to Huzara, for the 7th October 1848.

7th October 1848—Nara, Huzara—Under yesterday's date I presumed to offer some remarks upon the state of the rebellion in these parts but as the days are liable to interruption I take the liberty of recapitulating

Chuttur Singh with his force of 6 regiments 600 horse, 2,000 matchlocks, 6 breaching and about 10 field guns is encamped at Shumsabad close to the river Jodos and within a march of Attock at present a couple of Sipahi regiments and four guns might scatter his whole army and dissolve the rebellion. But this rebellion has been on foot two months and I have no certain intelligence of the advance of British troops. The collections of the season are just commencing and he has entire possession of them. Thus his greatest need is supplied. The people of the country regard him as a robber and pay unwillingly expecting that our army will advance. He has as yet no hold upon the country, but every day for the last month past has strengthened his position and every coming day that he is unopposed must make his footing firmer. His first idea was to hurry down to Lahore. But this seems to have been abandoned since the news of our reinforcement at that city and so far as I can learn he has no intention of crossing the Jelum even should the Peshawur force join him. The junction of this force with his must be regarded as a strong probability. We have seen six corps join his standard in spite of the opposition in many cases of their officers. Opportunity alone seems wanting to make every Sikh corps in the service side with the mutineers and Chuttur Singh and his force are so desperate without aid from Peshawur that they will risk everything to obtain it.

The question then is whether to allow this rebellion at present so easily put down, to grow into something formidable or by a prompt advance to scatter it in its weakness. The whole country of Huzara were our troops at hand, would rise to aid them, at present only a few of the people of the hills back me and the continuance of their support must depend upon the advance of our forces.

The Mooltan siege might be aided by troops from Bombay. The advance of the Bengal force in this direction appears to me to be urgently required, every day increases Chuttur Singh's treasury and makes him more dangerous

Above all it seems to me that the promptest measures should be taken to prevent the treasure of this Dooab from falling into his hands by multiplying British agents, each with a small force of irregular horse and matchlocks, who might take their several posts as our troops advance. The absence at this moment of Captain Lumsden from the Eusufzye country may (it is too much to be feared) open the road to a junction of the Peshawur troops with Chuttur Singh. I mention this, which I have so often before adverted to, to show the extreme importance of British agency. The people honor and respect our Government, and wherever there is a British officer he becomes a focus of power for our cause.

Were Captain Lumsden at this moment in the Eusufzye country the junction of the two Sikh forces were hopeless.

Chuttur Singh and his force are halting, it is said, for the Dussara at Shumsabad, close to the Indus and one march from Attock. Report says he has sent a band of horse to Nilab to take possession of two boats secured there for him by the chief, Jafir Khan, Kuttuk. But I trust our officers have not left any for him there. He is expecting the Peshawur force to join him and is making collections of the revenue.

J. ABBOTT, CAPTAIN,  
*Assistant Resident.*

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**No. 105 — Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 8th October 1848**

*8th October 1848.*—*Nara, Huzara*—Sirdar Chuttur Singh and his force were yesterday at Shumsabad, but the camp has disappeared and he has marched I believe upon Attock. Report says that two boats have been furnished him at Nilab and two at a ferry of the Loondai. He is bent upon effecting a junction with the Peshawur Brigade, and it is too probable that he will succeed. His after purpose is not certain, but from what I learn I infer that he wishes to establish himself in this Dooab. A Sikh Panchayat may any day subvert such a purpose.



His orders are issued in the name of Maharaja Dhulleep Singh and he has assumed, I understand, the office of Regent. Thus a rebellion which at first was contemptible and which at this moment two Sipahie regiments and four guns could scatter, has gradually in the course of two months of our inaction become a revolution which a strong army will be needed to quell. Barring treachery Attock might repel the insurgents, but treachery is a weapon familiar to Sikh hands, and reports of treachery in the garrison are rife. Without taking Attock, however it is probable that Chuttur Singh will effect a junction, and the consequences should be provided for without delay. Report says that the Bunnoo force is in open mutiny. This I have long anticipated, but I do not think the original design of the conspirators included the Sikh force, at least I could learn nothing certain of their disaffection.

J ABBOTT, CAPTAIN,  
*Assistant Resident*

No 106—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 11th October 1848.

11th October 1848—Srikote Huzara—Lieutenant Herbert informs me that several of my letter bags for Lahore have been returned to him owing to some obstruction on the road. Chuttur Singh has been about a week in Chuch encamped near the Indus searching for fords and for boats and collecting wood for rafts. Yesterday report said that he had found a ford deep indeed and dangerous, but that two sowars had actually passed over by it. If Major Lawrence has sent any matchlocks to oppose the landing of his people it will be difficult, if possible, for them to use a ford such as this is described to be; but it must be remembered that life, fame and fortune are in one stake and that the most desperate effort will be made to cross the army. No precaution, therefore, should be neglected. We hear that Aotar Singh with a force estimated variously as of 2,000 or 4,000 men, is on his road to Huzara to make collections and hold possession of the valley. The importance of an advance of our troops in this direction appears to me great. Chuttur Singh is at present regarded by the people as a rebel whose course will be immediately cut short. The zumeendars pay their rents to him with the utmost reluctance and often prefer sacrificing house and crops. His weak point was his empty treasury. His troops were on the point of

separating from him from want of pay and from the hopelessness of their prospects. He has been allowed, however, more than two months' leisure to recruit his treasury and is collecting the rents throughout these districts. The people hear nothing of our troops and gradually will give up our cause for want of encouragement. With the revenues of Peshawur and of this Dooab he will become really formidable. The advance a fortnight ago of a strong brigade, even as far as Jelum, would have dissolved this rebellion *in toto*. The troops were ready to fly upon a rumour. They had no hope and no prospect of pay. They listened readily to my remonstrances. Huzara was ready to rise to join any British force. But the people of the valleys dare not rise when there is no effectual support at hand. Chuttur Singh would have been an outcast had a single brigade then been sent. I would not have proposed to isolate one brigade. Another might have followed with all speed and the first might have halted at Jelum for the second. Assurance was all that was then needed to prevent any zumeendar from paying his rents and to prevent the Peshawur force from thinking of joining the insurrection, but the suggestions of Major Lawrence, Captain Nicholson and myself have not been acted upon. With assurance of reaping the revenues of this Dooab we could afford to increase our levies and distract the enemy's attention by threatening him on several quarters at once, and might retain the greater part of the Dooab in subjection.

J ABBOTT, CAPTAIN,  
*Assistant Resident.*

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**No. 107—Diary of Captain James Abbott, Assistant Resident, on deputation, Huzara, for the 16th October 1848.**

*16th October 1848—Srikote, Huzara*—For several days past we have made no attempt to send letters by the dak, several of our packets being detained at Attock. There appears, however, some possibility that the road may again be open although it cannot long remain so. I am not sure that I have recorded the arrival at my camp of Bukshie—, as Vuqueel from the Maharaja Goolab Singh. He is profuse in assurances of the friendly disposition of his master; disclaims for him all connection with Chuttur Singh; allows that there has been the closest intimacy, but states that the conduct of the Sirdar on several trying occasions

put an end to their friendship. He offers freely the use of the Jumboo troops, guns and treasury for my aid and denies the reports that any of the Jumboo regiments have joined Chuttur Singh, but allows that a corps of about 200 dismissed some months ago for mutiny and disarmed has gone over to the rebels. I trust that the strong sense of the Maharaja will keep him to his professions. He certainly has promptly answered my application for money and for guns although the former is of only half the amount I asked for.

Chuttur Singh was yesterday nearly *in statu quo*, that is close to Shumsabad, about six miles above Attork. He has not discovered any practicable ford and the passage upon skin rafts with the chance of opposition on the other side is very dangerous as a matchlock bullet may sink a raft. He sent again a deputation nominally for the relief of the garrison of Simulkund, who were supposed to be straitened for water. I allowed it to proceed in consideration of the earnest wish of Lieutenant Herbert though I had no idea that it would succeed. His emissaries instead of persuading the garrison to surrender ordered them to hold out. This is the second time the same treachery has been practised, and it seems to be a rule without exceptions that nothing said or done by a Sikh is ever what it appears. There seems to be no longer any idea of crossing the Jelum. The Bunnoo troops will join Chuttur Singh and both will endeavour to form a junction with those of Peshawur. How urgently the advance of our army is required I need not say, nothing else can preserve the Peshawur troops in their allegiance or prevent the widespread disorder and rebellion. Report says that Futteh Khan, Tewana has been murdered. A week or two before the outbreak in Huzara I wrote to warn him of a design upon his life, but my messenger never returned and was probably waylaid. Had the warning reached him it might have prevented the tragedy. The plot was concocted by the Officer Commanding the Artillery at Bunnoo a son of General Sooltan Maimood in Huzara who has been an active agent here. Yesterday we received about five days dak packets that had been detained on the road giving news from Lahore to the 8th. There are still disturbances in Gilgit, where the Maharaja's General has been killed. Two regiments have been sent to quell them. I imagine it is the intention of Chuttur Singh to attack my position from the western side by his retention of the Simulkund Fort. I have just driven the

garrison out of the Fort Dunna with great loss, capturing the *sunbooras*. They were alarmed, sallied out in the attempt to escape, were met by a party of my people under Peer Buksh Khan, Mullal, and routed with much slaughter. The Thanadar, a relative of Chuttur Singh, is captured. The fort is one of the most important in Huzara, and being at the back of Chuttur Singh's jaghirs he was anxious to retain it.

J. ABBOTT, CAPTAIN,  
*Assistant Resident.*

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No. 108.—Diary of Captain James Abbott, Assistant Resident, on deputation, Huzara, for the 25th and 26th October 1848.

*25th October 1848—Nala, Huzara*—The camp of Chuttur Singh marched to-day to Daman on the road to Hussun Ubdal. Rumour says that two sowars brought news from Raja Shere Singh which caused this move and that the Peshawur force have positively refused to join him.

*26th October*—Heavy rain all last night which has probably caused a halt. Two notes from the Resident reached me to-day,—the one by a messenger dated the 10th, the other by Maharaja Goolab Singh's Vuqueel dated the 11th, informing me that no accounts had been received at Lahore from Peshawur, Attock, or Huzara, since the 1st instant. A letter from Lieutenant Herbert, commanding in Attock, mentions that he had not received his usual letter from Peshawur and that a report had reached him *οφ θη μυτινί οφ θη τρωπισ ανδ λαπτυρε οφ μαιορ λαρενσ* which he was disposed to credit. This evening a strong report reached me from the western bank of the river that the removal of Chuttur Singh from the river's brink was in consequence of the request of the Peshawur troops who urged *θατ βι σο δοινγ η ωολδ θρωω θη μαιορ οφ ισ γαρδ ανδ εναβλε θη μυτινηρσ το σεισε ισ περσον*. I thought it extraordinary that Chuttur Singh had so soon desisted from his endeavours, knowing of what vital importance his success must be to his cause and the disposition of a part at least of the Peshawur force, and I greatly fear the true explanation is before us and that Major Lawrence has fallen into the snare. Sikh treachery is a thing beyond the comprehension of an European. All this danger had been saved by the timely advance of even a portion of our army or its assembly at Wuzeerabad or Ramnuggur instead of at Ferozepore. I wrote in quadruplicate my account of the

affair between Chuttur Singh's force and my matchlocks at Simulkund so that I hope one copy has reached the Residency. The loss of the enemy seems to have been under rated rather than exaggerated, and all seem to regard it as a triumph on our part. At any rate all was done that was possible upon such ground against so superior a force, and the Sikhs are as much disgusted at the affair as my people are elated. The Maharaja Goolah Singh informs me through his Vuqueel that he has received the Resident's instructions to attack Chuttur Singh, and asks my advice as to the mode. But as I have no hint of such a wish from the Resident, I have declined offering any advice. I would rather not have the Jumboo troops just now in Huzara, and although I believe the Maharaja to be too wise to engage in such a plot as that of Chuttur Singh, yet I think the employment of his troops in this campaign attended with hazard.

J ABBOTT, CAPTAIN,  
*Assistant Resident*

Our Post Office letters and papers I beg to suggest may be sent through the Vuqueel of the Maharaja Goolab Singh, who has undertaken to forward all despatches. P S—An urzee from the Chief, Ameer Khan of Oond has just arrived stating that a rebellion has broken out at Peshawur. It is stated that guns were heard this morning in the direction of the Sikh camp: a *Shellah* or salute probably in joy of the success of Sikh treachery.

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No. 109—Diary of Captain James Abbott, Assistant Resident, on deputation, Huzara, for the 30th October 1848.

30th October 1848—*Nara Huzara*—A man just returned by his own account from Peshawur gives a somewhat different version of the outbreak there. He says that Lieutenant Bowie was returning from the bath when some Sikhs endeavoured to seize him, but that he put spurs to his horse and escaped to the mansion that Major Lawrence, who was still in the bath, got intelligence of what had happened and reached home by a different route that for two days the Sikhs were trying to win over the Nujeebs, and that Major Lawrence was vainly endeavouring to persuade them to fire upon the Sikhs that during the third night, finding himself without support, Major Lawrence departed with

Lieutenant Bowie and Dr. Thomson so secretly that his guards were not aware of his departure until next morning, when the army attacked his house, that Sooltan Muhammad Khan sent his son with Major Lawrence, who is at Kohat. The latter part of the story seems doubtful, as the report is strong that Major Lawrence is in the mountains of the Afreedis. The Peshawur force by the latest accounts is said to be marching to the Bazour ferry to join Chuttur Singh, whose camp is reported to be waiting for it on the eastern bank. It is strange that no note from any of the party has yet reached us. The Barukzyes are no doubt in the conspiracy; long before the insurrection in Huzara Chuttur Singh was in constant correspondence with them. So far as we can learn he purposes making an attempt to secure my person, or drive me out of Huzara, and will then march toward Lahore. The place of assembly is believed to be Gujerat, and the Sikhs give out that it is chosen for convenience of aid from Jumboo. The Maharaja has forwarded me the Resident's Roobakaree, directing him to assemble troops at Meerpoor Chowmook, and to attack Chuttur Singh upon the Jelum, and referring to me for advice. I confess I think the experiment hazardous. The Maharaja has no army capable of coping with the Sikh force in its present strength. It is very doubtful whether his soldiers would fight against the Sikhs in a cause which has become national. They are so ill-paid that there is much danger of defection, and although I can scarcely believe that the Maharaja would endanger his own kingdom by mixing in such an insurrection, yet I conceive that the risk should not be run of bringing his troops as allies into the field, or allowing him just now to assemble or move troops upon the southern frontier. Any such movement were he not expected to aid, would put us upon our guard. At present we have no index of his disposition. Were Shere Singh not upon the Chenab, a force of four or five thousand men might render the crossing of the Jelum difficult. But at present they can do nothing useful that I know of. I would urgently bring to notice the dangers we have so narrowly escaped, and the confusion that has arisen by employing any but British troops to quell this insurrection. The relations hitherto borne between *μαραθα γυλαβ σινγ ανδ χυτтур σινγ* *αρε θωσε οφ φαθερ ανδ σου*. At Attock all was well on the 29th

J ABBOTT, CAPTAIN,

*Assistant Resident.*

The report here is strong that the Sikhs of the Manjha have promised to rise and join the insurrection, a strong force for them and for Jullundhur should be under arms, and Lahore should on no account be left weak

J ABBOTT

No 110—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 14th December 1848.

*14th December 1848—Srikote*—At length intelligence from Peshawur has reached me upon which I think I can rely Chuttur Singh actually gave all lands westward of the Jelum to the Barukzye Sirdars, it is even said that he promised them Cashmere. The Sirdars accordingly wrote to the Huzara chiefs directing them to seize and deliver me up. Some of their purwanas were brought me others have been withheld. On the arrival, however, of Dost Muhammad Khan on the 18th at Peshawur, the Sirdars fled. The Emir seized all Peshawur as his own, appointed his grandson chief of the Adalat, and his son Chief Governor, demanded of Chuttur Singh all the stores of the fortress removed by him or four lacs of rupees instead and a lac of rupees for each day's march from Cabul, and insisted as a preliminary upon the surrender to him of the British Officers. Accordingly it is said a body of Doorani and Sikh Horse has been sent to bring them back to Peshawur. It is believed that the Emir will demand as his right all territory to the Jelum and the whole of Cashmere. On the 12th, Khan-i Zemañ Khan, Chief of Gundgurb, brought me a purwana to his address bearing the seal of the Emir, ordering him to return to his allegiance to Chuttur Singh, and to seize and deliver up me and Mr Ingram. I was a little surprised at this, as I supposed the Emir had felt enough of our power to keep clear of our enmity. The seal however exhibits no appearance of forgery. I received a hint some days ago from Cashmere that Maharaja Goolab Singh was suspicious of the intentions of the Dooranis and anxious to strengthen the garrison of Moozuffurabad; but I regarded this expression of mistrust as a mere excuse for planting more troops in a suspicious post at a critical moment. News of our success in crossing the Chenab and putting to

flight Shier Singh's army reached me on the 12th I fired a salute that evening As a salute was fired at Attock during the night, I trust that Lieutenant Herbert has also received the intelligence Many of his garrison have deserted. Some were lately caught in the act, disarmed, it is said, branded and turned out, others, it is said, were killed by the fire from the fort whilst making off. Chuttui Singh has seized the families of many of them, and our slow progress has apparently disheartened them So far as I can gather from native accounts, there are before the fort the two Nujeeb battalions, Colonel Richpal Singh's, Pertab Singh's and Boodh Singh's regiments and ten guns The blockade is maintained, but the guns rarely fire I have sent Lieutenant Robinson of Engineers through the Jumboo territory to join the army, as he possesses valuable information relating to the theatre of war. His services have been most zealous and efficient For many weeks he had charge of the blockade of the Pukli Field Force, and his arrangements showed great skill and judgment They were defeated by the poltroonery of our levies at Duntour, after the flight of which it was necessary to break up the blockade Lieutenant Robinson ought to have reached the army on or about the 8th or 9th instant. His passage through the Jumboo territory will enable him to understand the state of feeling in that quarter It is scarcely possible that the Maharaja should desire the Dooranis as next door neighbours considering their claims upon Cashmere

J. ABBOTT, CAPTAIN,  
*Assistant Resident.*

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**No. 111—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 15th December 1848.**

*15th December 1848—Srikote, Huzara*—According to information which I consider trustworthy, Dost Muhammad Khan reached Peshawur on the 8th and took possession of the Bala Hissar, the Barukzye Sindars flying to their several jaghirs. He appointed the son of Muhammad Ukbur, chief of the Adalut, and his son Hydur Khan, Governor of Peshawur, seizing the whole district as his own

A letter bearing the Ummu's seal addrest to Khan-i-Zeman Khan, Chief of Gundgarh, was brought me, ordering that Chief to seize and



surrender my person. Two others have this day been sent me from his son and grandson to the same Chief, directing his personal attendance upon the Ummir previous to the fall of Attock. These last are written in the tone of one who would incite to a holy war, as the most unholy of crimes is misnamed.

Previous to the Ummir's arrival, Chuttur Singh had made over all territory westward of the Jelum to the Sirdars and they had address the Huzara Chiefs in the style of sovereigns ordering them to seize or to expel me. Report says that Chuttur Singh even gave them Cashmere but it is difficult to credit this. The purwana of the Ummir, if genuine, of which there is every appearance is a startling document little to be expected from one so wary and so well acquainted with our power and resources, who has hitherto resisted the strongest incentives of others to embrace our enmity. On the other hand, report obstinately affirms that his foremost stipulation was the surrender to him of the British Officers in order apparently to liberate them and that a party of Sikh and Doorani Horse have been actually sent to bring them back. It is also affirmed that he has demanded of Chuttur Singh four lacs of rupees in lieu of the Government stores removed by him and a lac of rupees for each day's march from Cabul. So far as I can learn Chuttur Singh sent for him in order to frighten the Sirdars into the surrender of Major Lawrence. Having accomplished his purpose he wrote begging the Ummir not to come. But the latter replied that he had assembled an army at great expense and marched with it several marches, and that he should consult his own convenience upon the subject. The current report is that Chuttur Singh is preparing to return to the Indus others say that he is in arrest but this report, which has been so often repeated appears to have no solid foundation.

A body of matchlockmen whom I had sent to Hurripoor to collect revenue, had an affair to-day with the garrison of Hurkishengurh which is five or six hundred strong, and drove them out of the town and back into the fort with great slaughter.

The skirmish lasted several hours, but the particulars have not yet reached me. The blockade of Attock is maintained, but there is little if any firing. I have no news from Lieutenant Herbert since the 5th, but as he fired a salute on the night of the 12th, I trust he has heard

of our passage of the Chenab. A large number of his garrison have deserted and speedy advance is of the utmost importance to encourage the remainder.

J ABBOTT, CAPTAIN,  
*Assistant Resident*

No troops have advanced to Moozuffurabad according to the latest account. The report of their advance was strong

**No. 112.—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 18th December 1848**

*18th December 1848—Srikote, Huzara*—Chuttur Singh and Dost Muhammad Khan have actually arrived, the former at Jhangeera, the latter at the Indus, northward of the Loondai river. The Ummir has with him about 3,000 men and guns, and has come with the avowed purpose of aiding Chuttur Singh. From Moozuffurabad I learn that the Vuqueels of Dost Muhammad Khan and Sirdar Chuttur Singh entered Cashmere lately, disguised as merchants. The Vuqueels of Chuttur Singh and of Moolraj are confidently reported to be resident in Cashmere, their names are even mentioned. The junction of the Ummu with the Sikhs appeared a most improbable thing. Yet it has happened. The junction of Maharaja Goolab Singh seems also improbable for the same reasons of self-interest, but we must not be astonished if it should take place. A disagreeable report reached me yesterday that Lieutenant Robinson had been imprisoned by one of the hill tribes in the Maharaja's country. I trust there is no truth in the rumor, but some suspicious circumstances have made me uneasy about it. I have received no letter from Lieutenant Robinson since the 3rd March from Moozuffurabad. The Maharaja's writer, or at least a newswriter at Cashmere, wrote some time after his departure to say the Maharaja had shaped out for him a particular route. I replied to the Vuqueel that I hoped he had given Lieutenant Robinson timely intelligence, it struck me at the time as an excuse for any difficulties Lieutenant Robinson might experience. A few days ago the Vuqueel remarked to me that Lieutenant Robinson had not taken the route prescribed by the Maharaja. I replied that probably the advice had not reached him in time, and again I felt uneasy. All the hill tribes, disobedient to the Maharaja, regard us as their

protectors, and none of them would molest Lieutenant Robinson nor any British Officer unless incited by authority, and I regard it as quite impossible that Lieutenant Robinson's progress should be impeded without the Maharaja's express however secret order. I trust however that Lieutenant Robinson has reached his destination in safety. If otherwise I earnestly hope warning will be taken and the campaign be regulated to guard against assault from the mountains. I mentioned in yesterday's Journal that a writer at Cashmere had informed me of the defection of a Sikh regiment there that the Maharaja had wished to disarm them, but had not done so and that they were deserting fast to join Chuttur Singh. Surely a little energy would have sufficed to disarm them. Mr Inglis' note of the 1st has just reached me *via* Cashmere his previous favor was of the 27th. In my former Journals I have noted the receipt of purwanas addressed to two of the Huzara Chiefs and bearing the seal of the Ummir, directing them to seize and surrender my person and that of Mr Ingram and to return to their allegiance to Chuttur Singh. I had hoped they were forgeries but to-day's intelligence proves their authenticity. The bribe offered to Dost Muhammad Khan is so far as I can learn all territory west of the Jelum—a tempting bribe certainly. We shall see whether it can be realized. I have no late news from Lieutenant Herbert nor from any of the prisoners. Not knowing what may be the plan of the campaign, I trust I shall be favored with explicit instructions how to act.

J ABBOTT CAPTAIN,  
*Assistant Resident*

It seems to me highly improbable that the Ummir should plunge into war with the British unless assured of support from Jumboo.

No 118.—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 19th December 1848.

19th December 1848—*Srikote, Huzara*—I hasten to qualify my report of yesterday. A Moonshee whom I sent toward Peshawar wrote me that he had met the army of Dost Muhammad Khan on his road

Another report to the same effect made me suppose the arrival of the Ummir or of his army certain Yesterday, however, I received intelligence, which throws doubt upon the Ummir's advance, stating that he is still at Peshawur, that he has promised to follow Chuttur Singh, who has arrived in Chuch, in eight days, and that his son actually accompanied the Sirdar part of his first march My Moonshee must have been bribed by Chuttur Singh to spread this rumor Chuttur Singh seems to have come post haste from Peshawur in two days At Attock there was little firing yesterday Report says the batteries are withdrawn, but this report has several times deceived me. Lieutenant Herbert on the 16th was well, but earnestly demanding succor. The enemy were two nights running foiled in their attempt to fire the West gate It is built up with brick inside, so that even their success would not be decisive. It is supposed that they suffered some loss in the attempt Lieutenant Herbert is στρατενεδ φορ φυνδσ μανι οφ θη γαρρισον αυε δεσερτεδ His fire has, I believe, destroyed another gun of the besiegers, striking it in the muzzle All the arrangements of this young officer have displayed the most consummate prudence, firmness and judgment His position has from the first been extremely critical, as there was not a man in the garrison upon whose good faith he could rely But by turning out all objects of suspicion, even when otherwise recommended by their qualifications, he has contrived hitherto to stave off the meditated treachery, and to preserve the fortress, which is little injured by the enemy's shot. The walls are said to be 52 feet high, of large wrought stones cemented with lime The shot of the field guns rebound quite harmless, and the 12-pounder battering guns have been sent on to Sher Singh, one of them being destroyed by Lieutenant Herbert's fire. Dost Muhammad Khan has given out that he will follow Chuttur Singh in a few days But persons who are deemed good authority in Peshawur doubt this. He will probably wait to learn Sher Singh's success or defeat ere he mix himself up in his quarrel I hope that Lieutenant Robinson, who left Moozuffurabad on the 7th ultimo and ought to have reached the camp of his Excellency the Commander-in-Chief, has arrived He passed through the Jumboo territory. I am a little uneasy about him, any obstruction to his progress would have a most suspicious appearance just now The Maharaja writes to say he has sent me 30,000 more Hurri Singea rupees or 15,000 Company's rupees. I will report when

it is received. I have no authentic news of the prisoners Lieutenant Bowie is with the blockading force at Attock. The others are said to be either at Rohatass or at Sookoo in Potowar

J ABBOTT, CAPTAIN  
Assistant Resident

By this morning's report the batteries are not withdrawn, but they have little ammunition and a march is expected

No 114—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 21st Decemher 1848.

21st December 1848—Siskote Huzara—Some of my people sent out for information returned yesterday saying they had met six sowars on their way to Cashmere *via* Meerpoor who upon being questioned said they were the servants of Chuttur Singh, Ummir Dost Muhammad Khan and of Sooltan Muhammad Khan respectively that they were sent on an embassy to Maharaja Goolah Singh Lieutenant *ηρβερτ* *ορτντς* *βαν* *η* *δς* *νο* *ωπ* *οφ* *βεινγ* *αβλε* *το* *ωλδ* *ουτ* *μασι* *δασ* *λαργερ* *υγλσσ* *συρ* *αρμ* *αδναται* *θη* *λοσσ* *οφ* *ατοκ* *ωουλδ* *σ* *αρσελ* *βη* *ομκενισατεδ* *βι* *θη* *κακτυρε* *οφ* *μυλτα* Dost Muhammad Khan has not yet arrived He has promised to march on Friday, but if the movements of our army are prompt, will probably wait to see the result ere he plunge into such an enterprize If our army delay fear will be the motive attributed and *θη* *ωλε* *πυτυαυβ* *ωουλδ* *βη* *ενδανερεδ* Our army is so large that I see not what could be done with more *τρικσ-δω* *βαι* *ουλδ* *βη* *σιβσιςιτεδ* *ε* *βισ* *δωβ*. The Sikh army at this moment is impressed with the belief that it will be annihilated. *βισ* *ω* *θη* *ρικαλ* *μωμεντ* A blow now will do more than *α* *τεμκεστ* *οφ* *βλωσ* *α* *μονθ* *ηνσε*, prevent further coalition secure to us and wring from the Sikhs the revenue of this Dooab, *σανε* *ατοκ* *πρεντ* *φωρβερ* *ουτβρεακσ* *ε* *συρ* *ρεαρ* *ανδ* *ομεραμ* *αλλ* *δισπωσιςιου* *το* *μισν* *ε* *ενδωσταν* As individuals the lives of Lientenant Herbert and myself are not worthy to be balanced for one moment against any measure of general expediency But the posts we hold are of essential consequence *το* *θη* *σκηδ* *σεντλιμεντ* *οφ* *βισ* *αμπαγν* *ανδ* *θη* *λοσσ* *οφ* *θεμ* *βι* *ω* *μει* *εναβλε* *θη* *ενεργησντε* *το* *προλογθη* *ωαρ* *αποθερ* *ωρ* Chuttur Singh has felled some

palm trees and is making up scaling ladders. He has also given 1,500 rupees to the Malhas to construct a bridge of boats across the Indus for the Ummir's army. There has been no firing at Attock for some days. The baggage of the blockading force is sent on toward Rawul Pindi. The terror inspired by our cannonade of the 3rd appears very great. If followed up promptly the whole Sikh army is predisposed to run. Numbers have deserted since the 3rd. It is the first severe taste they have had of British artillery, having hitherto been in trenches during our cannonades.

The passage of the Jelum alone would have an excellent effect. Chuttur Singh has given out that we have offered him all territory westward of that river and any *εσεταιιον το αδυνασε ωιλλ γινε στρενγθ το θη νοτιον ανδ καυσε θη πεοπλε το ρεγαρδ θη σικσ ορ δυρανισ ασ θειρ μαστερσ*

J ABBOTT, CAPTAIN,  
*Assistant Resident.*

**No. 115.—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 26th December 1848.**

26th December 1848—Srikote, Huzara—By a note of the 24th from Lieutenant Herbert it appears that the Ummir Dost Muhammad Khan has actually commenced hostilities with us, his people having fired upon the garrison of Attock from the fort of Khyrabad. Up to that time only a small detachment of his force had arrived. Chuttur Singh appears still to be lingering at Mansir in order that Dost Muhammad Khan may arrive in Chuch previous to his departure. Of the Ummir's movements my information is imperfect. The last account represented him as at Hushtnugr and about to proceed to Sohaut and had our army moved promptly forward, there is much doubt whether he had trusted himself across the Indus. The speedy passage of the Jelum has ever appeared to me a movement of the first importance. First, because it could have been past easily whilst the enemy were unrecovered from the panic of their repulse and had been allowed no time to strengthen themselves upon its margin, and whilst five corps and ten guns were absent at Attock and the absence of Chuttur Singh

discouraged the army, secondly because the knowledge that no river intervened between them and succor would have strengthened the garrison of Attock in their allegiance and thirdly because the presence of our army in this Dooab would have prevented coalition. Any further advance might have been deferred to a more convenient season. Dost Muhammad Khan has addressed, I believe all the chiefs of Huzara claiming their allegiance. But only two of them have informed me of the circumstance. On the 24th I forwarded letters written by the son and the servants of the Ummir to the garrison of Attock, ordering them to desert the service of infidels and range themselves under the banner of Islam.

J ABBOTT CAPTAIN

*Assistant Resident*

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**No 116—Diary of Captain James Abbott Assistant Resident, Huzara, for the 29th December 1848**

*29th December 1848—Srikote Huzara*—Chuttur Singh is still at Mansu waiting for the Ummir of whose movements I have no very certain intelligence. He, the Ummir, has addressed the Chiefs of Huzara commanding their allegiance and aid to Chuttur Singh. His son at Khyrabad has commenced hostilities by firing upon the garrison of Attock. Chuttur Singh has with him still three not four regiments,—Richpal Singh's Partaub Singh's Baboo Pandah's and I believe Boodh Singh's. Such, at least is my last account but native testimony is never to be depended upon and previously only three Sikh regiments were named. The Nujeebs have been sent forward one Corps, it is said, to Baug Bootur the other to Hussun Ubdal. Chuttur Singh distrusts these men. Six or seven guns were fired last evening at Attock. It rained all yesterday. Report says that Dost Muhammad Khan has returned from his visit to Sobant but the result is unknown, and indeed so much false intelligence is sent me from all quarters that I can trust none. I have news from Lieutenant Herbert to the 25th. I have already more than once stated the nature of his position.

J ABBOTT CAPTAIN,

*Assistant Resident*

No. 117.—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 30th December 1848

30th December 1848—Sikote —Yesterday arrived an answer from the Ummir Dost Muhammad Khan to a letter which I addrest to him about a month ago, when report said he had come with friendly intentions. It will be seen that he claims Peshawur, the Derajat, and Huzara, and intimates that he has sent an army to take possession, and that he will then be happy to reconcile differences between the British and Sikh Governments. He has accordingly addrest the Huzara chiefs claiming their allegiance and ordering them to seize my person. These putwanes, with one exception, have been shown me only by those whom I know to be intriguing with the Ummir. Had our army crossed the Jelum immediately after the affair of the 3rd, Dost Muhammad Khan had never thought of crossing the Indus and the enemy might have been destroyed in detail with little difficulty, only about half the Sikh force being assembled on the Jelum. The bearer of the Ummir's answer rates his force at 12,000, of which there are six drilled regiments amounting to 3,600. He states that the force is marching toward the Bazour Ferry. Chuttur Singh is still before Attock.

J. ABBOTT, CAPTAIN,  
Assistant Resident

No 118.—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 31st December 1848

31st December 1848—Sikote —Yesterday I forwarded a copy of the Ummir Dost Muhammad Khan's letter to my address, by a *cossid*. He claims Peshawur, Huzara, and the Derajat, says that he has sent an army to take possession and that he will afterwards be happy to reconcile differences between the British and the Sikhs. According to the best intelligence I can command, he is actually marching toward the Bazour Ferry of the Indus, if not arrived there. The bearer of the letter estimates his force at 12,000, of which there are six drilled regiments, three of 500 each and three of 700. I do not fear his force, but his intrigues will render my position very precarious. His son is at Khyrabad, but Herbert's fire seems to have silenced his guns. I earnestly



hope our army will pass the Jelum before the junction of the Dooranis and Chuttur Singh with Sher Singh. That obstacle overcome, the army might take its time to consider any further movement. There are at present absent from the Jelum five or six regiments nearly half the effective force and the rest are greatly dispirited. Mr Inglis' letters of the 9th and 11th arrived together yesterday by the Cashmere dak. I have not heard since the 25th from Lieutenant Herbert. I offered to cash his bills but he had procured money from shroffs.

J ABBOTT CAPTAIN,  
*Assistant Resident,*

*Diaries of CAPTAIN JAMES ABBOTT, Assistant Resident, and later  
Deputy Commissioner of Huzara, 1849.*

[ *Note* — Captain Abbott was styled Assistant Resident, Huzara, until the end of April 1849, and Deputy Commissioner, Huzara, from the 1st of May 1849 ]

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**No. 1.—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 2nd January 1849.**

*2nd January 1849—Sikote, Huzara*—A large portion of the Doolani force is encamped near the Bazour Ferry, where Chuttur Singh has built them a bridge of boats. The son of the Ummir is at Khyrabad, but his gun has been dismounted by Lieutenant Herbert's fire. I have vainly represented the importance of speedily crossing the Jelum. It would have saved Attock, prevented the coalition of the Ummir with Chuttur Singh, and have reduced the Sikh cause to the lowest ebb; moreover, it *was* ten times easier than now it is likely to prove. After the passage of the Jelum, delay would have little signified. *θη ποσιτιον οφ ηρβερετ ασ βεκομε μοστ περιλουσ ανδ ι αμ ιν ουρλι εκπεκτατιον οφ λεαρνινγ οφ θη φαλλ οφ ατοκ*. As the Ummir expressed a wish to receive an answer, I replied, yesterday, that I had no authority to answer his demands, an authority vested in my Government, nor could I say what answer Government might give, but that I could assure him he would incur the serious enmity of my Government, if he did not call away his son from the siege of Attock, or if he should cross the Indus, and I bade the messenger explain to him the absurdity of joining Chuttur Singh, who, if successful, would instantly exclude him from Peshawur, and, if beaten, could not for an hour save him from our vengeance. His army is rated at about 12,000, of which 3,600 are drilled troops. Lieutenant Bowie is still with the Sikh camp at Attock. Chuttur Singh is there, but the Nujeebs have been sent on to Rawul Pindi. I heard from Lieutenant Herbert dated 30th

J ABBOTT, CAPTAIN,  
*Assistant Resident*

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**No. 2.—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 4th January 1849.**

*4th January 1849—Srikote, Huzara*.—The fall of Attock is reported to me by authority, which I can scarcely venture to doubt. Lieutenant Herbert's letters must have prepared Government to expect it. The salute which I heard on the night of the 2nd assured me of the fact. The particulars have not yet reached me. But I believe that Lieutenant

Herbert, finding it the decided opinion of all his officers that the men would no longer stand by him, was attempting to escape upon a raft and was betrayed by those who were to have aided him. He is said to be a prisoner in the Sikh camp. Still his defence of that fortress may not have been in vain, *υφ' θη πασσαγε οφ θη ιηλημ ισ εφεκτεδ βεφορε θη αρριναλ οφ φιφτην ορ τωεντι θουσανδ αδδαιωναλ ουκωνεντο*. So far as respects our reputation and interest in this Dooab Peshawur and Cabul *θη λουσ οφ ατοκ ισ ενλι σε ονδ το θη λουσ οφ λαμρε ος λογγ μι βη αβλε το ελδ μι ος ποστ ισ περι δουρηφελ σομι οφ μι σταννχεστ αδηρηντο αλρενδε ρεγαρδ ιτ ασ επλεσσ*. The Dooranis are detested more than the Sikhs. But there is an understanding amongst all Pathana in this country which very generally *πρεποντο βλαδανδ βεση θημ*. It is said that the Ummir Dost Muhammad Khan has applied to Maharaja Goolab Singh for money and that upon his answer depends his further movements. I believe his finances are in a most deprect state and his army very ill paid. It is estimated at 12,000. The fall of Attock may encourage him to go further than at first he purposed. Our long delay beyond the Jelum is ruining our cause in this Dooab. The whole Moosulman population was prepared to aid us. But our delay is attributed to the basest motives, and I hear that the Sikh partizans are plundering the villages and towns with impunity. Thus funds will be found for the Sikh army without which it must instantly have dissolved. Time too has been given for the counter influence produced by the accession of a Muhammadan Prince and people to the Sikh cause. nor need it be repeated that Dost Muhammad Khan would never have joined the Sikhs had we followed up our advantage on the 3rd December. I feel it to be my duty to state and repeat these truths even at the risk of appearing presumptuous for I alone am in a position to perceive the injury produced by this delay in its full extent. After crossing the Jelum, delay would have been comparatively unimportant.

J ABBOTT CAPTAIN,  
*Assistant Resident*

No. 3.—Diary of Captain James Abbott, Assistant Resident Huzara, for the 6th January 1849

6th January 1849—Siskote Huzara—I have in my Journal of the 4th and Despatch of the 5th instant related the fall of Attock. The news

of to-day confirms my hope that Lieutenant Herbert at least (if not Sergeant Carthy) has escaped pursuit with six or seven followers. Dost Muhammad Khan by yesterday's report was still encamped at Bazour Ferry near the bridge of boats, and only a portion of his army had crossed the river. I enclose the substance of his purwanas sent on the 4th to the chiefs of Huzara. There is no doubt, I believe, that Jellal Khan, Kakur, has been sent by him to Cashmere, to persuade the Maharaja to advance to Moozuffurabad or to advance funds for the war. It is remarkable that the Maharaja through his Vaqueel has consulted me upon the propriety of sending two more regiments to Moozuffurabad to relieve those cantoned there, upon plea of his diffidence of the fidelity of the latter. I have replied that I think they had better be relieved one at a time, the relieved corps marching away first, or the idea will get abroad that the Maharaja is joining the insurgents. I can scarcely believe that a Prince so sagacious would stake either his money or his safety upon such an absurd venture. At the same time, the season is one of prodigies, and an additional instance of insanity must not be wondered at. Reports are industriously spread throughout Huzara that Dost Muhammad Khan has with him 700 Moollas, who have shut the door of paradise against all Moosulmans falling in my cause or that of the British. I held a council of the Huzara chiefs yesterday, who unanimously decided to fight against the invader. At night, however, Khan-i-Zeman Khan, the Gundgurbh Chief, and two or three others, were busily engaged in shaking the minds of the rest. Dost Muhammad Khan has turned the Sikhs out of Attock, according to the last report, and has placed there a garrison of 500 jezailchees. I have too often dwelt upon the injury our cause is sustaining by the hesitation of our army to cross the Jelum in front of an army inferior in numbers, discipline and courage. It is by the reputation of our valor that we have won and preserved our Eastern Empire. The maintenance of that reputation is worth a large risk. The difficulties of the passage are increasing hourly.

J ABBOTT, CAPTAIN,  
*Assistant Resident*

No 4.—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 11th January 1849

11th January 1849—Srikote, Huzara—Captain Nicholson's note of the 3rd instant came to hand yesterday I sent my diary of yesterday to Lieutenant Robinson by his return messenger I stated therein that Chuttur Singh who had purposed remaining for the *Sunkrat* at Hussun Uhdal receiving some apparently bad news from his sons camp had suddenly started for the Jelum on the afternoon of the — that Akram Khan, son of the Ummir, with 3 000 foot and 1,000 horse and six guns was said to be following Chuttur Singh but that there were doubts of his proceeding far Another force is said to be destined for Gundgurb But if my followers continue true I have little apprehension from the Dooranis Their intrigues alone are dangerous By the Cashmere dak I have no letter later than the 15th ultimo none having arrived lately A man from Cashmere confirms the report of Jellal Khan Kakur, the Vuqueel of Dost Muhammad Khan having arrived there and states that he is treated with great attention This man is one of many who believe the Maharaja to be secretly in league with the insurgents that he sent money to Moolraj and Chuttur Singh etc., etc. I know no facts that can justify the surmise and believe the Maharaja to be too cautious and too fond of his money to throw it away with so little hope of return At the same time should the Ummir really send on succor to the Sikhs it will be a very suspicious circumstance, as he has no funds to feed an army and I have reason to believe has positively refused this aid unless assisted by the Maharaja The presence of Joalla Suhaie at Lahore is considered by many a guarantee of the sincerity of his master as he is much attached to this servant, in whom he reposes the greatest confidence I fear it is too certain that Lieutenant Herbert has been captured. Report says that Futteh Khan of Ghsyb has joined the insurgents I feared he would not remain staunch after the fall of Attock which has shaken down our authority in this Doab I believe nearly all the Huzara chiefs have been secretly intriguing with the Dooranis

J ABBOTT CAPTAIN,  
Assistant Resident

**No. 5.—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 13th January 1849.**

*13th January 1849—Srikote, Huzara*—It is said that the camp of Dost Muhammad Khan has shifted about three *koss* from Bazour toward the Eusufzye country. I have the following intelligence from the camp of the Ummir, which I consider authentic. It is from an eye-witness, who can have no object in misrepresentation. Chuttur Singh has given 60,000 rupees to the Ummir, that is, 30,000 in cash, 15,000 in shawls etc., leaving a balance of 15,000 to be received at Rawul Pindi. For this sum the Ummir has lent him the services of nominally 1,000 horse, but really less than 800, who have marched with the Ummir's son, Akram Khan, for Rawul Pindi. The men are said to be greatly disheartened at the order to march, and to consider it as equivalent to a sentence of death. I think it probable they will find some excuse for proceeding no farther than Rawul Pindi. A Vuqueel of Maharaja Goolab Singh is actually in the Ummir's camp, and appears at his Durbar. His name is Boota Mull. He has been repeatedly seen in Durbar by witness, who does not, however, believe that any pecuniary aid has been rendered by his master to the Dooranis, and believes that the Vuqueel is there only to see how the game goes that his master may shape his course accordingly. The Ummir's army is very wretchedly paid. I have already reported the actual march of Akram Khan toward Rawul Pindi. About half the Ummir's army is in Chuch, destined it is said for Huzara. The rest is with him on the western bank of the Indus and in Attock; a small Sikh force is still encamped at Pahr, destined for Huzara. From Cashmere I learn that Dost Muhammad Khan's Vuqueel, Jellal Khan, has received three private audiences of the Maharaja, who has answered his master's letter, that he receives rupees five daily as maintenance; that——, a Colonel of the Maharaja's army, has been sent from Moozuffurabad to Jumboo with orders to raise 4,000 fresh levies, and that similar orders are issued to Hurri Chund. This intelligence, however, comes from an enemy. I think it quite certain that Jellal Khan has reached Cashmere. The Maharaja's Vuqueel here assures me that if this is the case he shall be seized and delivered up to our Government. It appears to me very possible that the Maharaja may be alarmed at indiscreet and often false accusations of his conduct, which appear in the newspapers, and I would beg respectfully to



suggest that no notice be taken of the reports I have just noticed unless further confirmation is afforded. It may serve Dost Muhammad Khan and Chuttur Singh's purpose to have a person at the Ummir's Durbar to personate the Jumboo Vuqueel. It appears to me at variance with the usual caution of the Maharaja to have an acknowledged Vuqueel at the Ummir's Court.

J ABBOTT CAPTAIN

*Assistant Resident*

It is however, scarcely possible to believe that Dost Muhammad Khan would enter into hostilities with us unless flattered with hopes from Jumboo.

No 6.—Diary of Captain James Abbott Assistant Resident, Huzara, for the 16th January 1849

16th January 1849—Srikote Huzara—It is reported and appears probable that Dost Muhammad Khan has sent a messenger to recall his son Akram Khan and the 600 horse. He has probably learnt the fall of Mooltan, but report says also that he has heard of our army having crossed the Jelum, which I doubt. He himself is still on the Western bank of the Indus with half his force. The other half is at Shumsabad. My scouts report that he has broken up the bridge at Bazour Ferry, and has no idea of crossing to this side of the Indus that he had intended to attack me, but was dissuaded from it on learning the loss sustained by Chuttur Singh at Simulkund. He is aware that anything like retreat on his part may arouse all his enemies who only wait their opportunity to set upon him. Indeed I gather that his present policy is adopted with a view to bully us into the cession of Peshawur and the Derajat. I humbly opine that the reasons *αγαντες τις σπονδιαν αρη υπαγορευθησιν α μωλδ κια ρυκλε θη στρεψθ ιε δουδωρ θη ρενειν οφ αθωλ* and bring us into immediate contact with that State for a space of 400 miles, instead of that contact being confined, as at present, to a single point and that one a battlefield in which a disciplined army must always conquer. At the same time *α μαι βη ας ωλλ το διφρη α δισιστιν ανερ υπηλ ουρ αρμ αππροαχ θη ινδου*

J ABBOTT, CAPTAIN

*Assistant Resident*

No. 7 —Diary of Captain James Abbott, Assistant Resident, Huzara, for the 17th January 1849.

17th January 1849—Sikotc, Huzara —Dost Muhamad Khan is still on the western bank of the Indus with half his army. The other half is at Shumsabad. It is said that he has recalled his son Akram Khan and the 600 Doodani Horse from Rawul Pindi. Chuttur Singh is said to have marched without pause for the Jelum, after extorting rupees 60,000 from the shroffs of Rawul Pindi. A force of about 800 Sikh troops and two guns is at Pahr, destined for Huzara, but apparently they are afraid to venture hither. I stated in yesterday's Diary my belief that Dost Muhamad Khan's coalition with Chuttur Singh was designed to bully us into the cession of Peshawar and the Derajat, and that I humbly opined there were *υνανσεραβλε οβιεκτιονσ το θισ σεσσιον* which would *κυαδρυπλε ισ ποωερ εν δουβλινγ ισ ρευεννε ανδ βρινγ ιμ ιντο κοντακ ωιθ υσ* for a space of 400 miles instead of that contact being limited as now to a single point, and that a battlefield, so favourable to us. At the same time, it appears to me desirable *το αλλω ιμ το ινδυλγε ανι ωπε η μαι αυε φορμεδ οφ θη σεσσιον υντιλ ουρ αρμι αππροαχ θη ινδυσ*. Some absurd story had been sent him of the death of Her Majesty without issue, and of England being in confusion in consequence, and from a letter to me from Colonel Richpal Singh, one of the ringleaders of this mutiny, I learn that stories are current in the Sikh camp of a general coalition in Hindustan against us, the Raja of Nipal having joined, in consequence of a box of detonating powder having been sent him by our Government with intent to blow him up. Such trash is greedily swallowed by the ignorant, amongst whom the Ummir must be rated. The Sikh army is much straitened for provisions. Were the Mooltan force to move smartly up this Dooab, the Sikhs would be compelled to fight upon ground of our choosing, as all their supplies would be cut off, and any risk to Huzara would be more than compensated by such an opportunity of crushing them.

J. ABBOTT, CAPTAIN,  
Assistant Resident.

**No 8.—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 19th January 1849**

*19th January 1849—Srikote, Huzara*—I have little to add to my Journal of yesterday Dost Muhammad Khan is still on the western bank of the Indus half his force is at Shumsabad. A man just arrived from Rawul Pindi states that Akram Khan and his horse had progressed as far as Hoormuk, a march beyond Rawul Pindi. His recall is uncertain Chuttur Singh, I think must have reached the Jelum though some report that he is still in the neighbourhood of Rawul Pindi. The Sikh force at Pahr marched last evening to Hurrupoor and fired a salute of 30 or 40 guns I know not what for. There is a report of Shere Singh's death by the hand of one of his own soldiers but he has been killed so often that he must have nine lives to have fallen now. Chuttur Singh is said to have had great difficulty on leaving Rawul Pindi, owing to the troops insisting upon the fulfilment of his promise to pay them there. He extorted not 60 000 but 7 600 rupees from the shroffs and promised the troops at Bissoil, his jaghur. His means of doing so are very doubtful.

J ABBOTT CAPTAIN,  
*Assistant Resident*

Ruttun Singh, Maun, commanding the troops just arrived.

**No 9.—Diary of Captain James Abbott, Assistant Resident, Huzara, for the 20th January 1849**

*20th January 1849—Srikote Huzara*—The Ummir is still on the further side of the Indus, but the force at Shumsabad advanced yesterday to Huzroo with the intention, avowed by purwanas to the Mishwanis, to attack Srikote. I am quite ready to meet them. The Ummir it is said, made a corresponding movement up the river to the Oond Ferry. The horse intended to support Akram Khan, estimated at from 600 to 1 000 have marched towards Rawul Pindi and a small body of horse have posted themselves at Hussun Ubdal avowedly for Huzara. My messengers report that Akram Khan has not crossed the Jelum, and it is said he writes in the strongest terms to dissuade his father from crossing the Indus until the affair of the Jelum is closed. I trust to be able to make good my post against the Ummir. An attack would be hailed by my people as an amusement and I do not think the makon

tents have force enough to imperil my position. The Sikh force remains in Huzara. The people are not yet ready to aid me heartily for their destruction. I must wait until some fresh success of our arms inspires them.

J ABBOTT, CAPTAIN,  
*Assistant Resident.*

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**No 10 — Diary of Captain James Abbott, Assistant Resident, Huzara, for the 30th January 1849**

*30th January 1849—Srikote, Huzara* — The camp of the Ummir is reported to be still on the western bank of the Indus, but it is said that on the invitation of one or two traitors at Srikote he has actually ordered an advance against Gundgurb and I believe there is no doubt of the fact. Nevertheless I hope to defeat his army if he really attacks me, and so long as the Mishwanis continue faithful have no apprehension for this post. If the people of the plain would unite heartily in their own defence I could easily drive out the Sikhs and Dooranis. But they appear to have lost all spirit. There are rumours of an action on the 21st, but this appears improbable as I have Major Mackeson's note of that date. Considering the extraordinary facility of the Sikhs in rallying after defeat, much blood will be saved by waiting to strike until the blow can be decisive. Our advance can no longer save Attock, nor destroy the enemy in detail, nor prevent the coalition of Sikh and Doorani, all of which it would probably have effected two months ago. The instant General Whish's force enters this Dooab the supplies of the Sikhs will begin to fail them and a defeat will then be utter perdition to them. I venture with the deepest submission to offer these remarks. A Vuqueel named Ram Dass, late in the service of Dewan Adjoohia Pershaud and living in the Vuqueels' Havelee, sends Sher Singh timely notice of all our intentions.

J ABBOTT, CAPTAIN,  
*Assistant Resident.*

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**No 11.—Diary of Captain James Abbott, Assistant Resident, Huzara, from the 1st to the 6th April 1849.**

*1st April 1849—Srikote, Huzara* — The battlements of Srikote are fast rising. I have formerly mentioned the necessity of re-establishing

this castle Nearly all the Jaghirdars of this mountain (Gundgurb) went over to the Dooranis. Many of them are consequently in exile, separated from their old haunts only by the stream of the Indus. Many of the people of the mountain who were disposed to be loyal were deluded by the belief that the British star had set, and were led to appropriate or to conceal for the traitors, or to purchase of them Government or my private property. All these persons are naturally alarmed at the re-establishment of British authority and must long remain more or less disposable in the hands of the more flagrant offenders. The charge of Gundgurb therefore becomes weighty because the population of this mountain are the bravest in Huzara the name is connected with signal defeats of former Governments, and it is now for the first time during many years unchecked by the proximity of troops in Qatur the nearest cantonment being Rawul Pindi distant 45 miles. I thought the re-establishment of Srikote under these circumstances indispensable to the tranquillity of the district, and I am glad to find that Captain Nicholson concurs in this opinion. My experiment last year of doing without this fort was successful but under very different circumstances. A large field force was at Husun Ubdal another at Huzara. The Turkhailees had had their old jaghirs restored the land tax had been lightened all were anxious for the continuance of the existing rule which protected them from Native tyranny. Such is even now the popular feeling but there are many exceptions from it. Even these will, I hope, soon cease to exist. But the process must be gradual. Meanwhile the means of compelling obedience are absolutely necessary to tranquillity. My great difficulty consists in procuring drafts for the garrisons from our provinces. I have none at present, and I think that the greater part should be of this character. Lieutenant Robinson of Engineers arrived this evening from Peshawur to complete the boundary survey interrupted by the late insurrection.

*2nd April 1849—Srikote*—The works of the fort are going on rapidly. The day has been spent as usual in answering urzees and in kucherry duties.

*3rd, 4th, 5th, 6th April—Srikote*—Occupied as on the preceding day. I learn from Attock of the arrival there of Major Mackeson, Agent to the Governor General, on his return *via* Cashmere to the Provinces. Also that individuals of the Peshawur troops cannot leave their lines at

night without danger of being murdered. It is difficult to account for this in a district in which the British have hitherto been popular.

J ABBOTT, CAPTAIN,  
*Assistant Resident.*

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**No. 12—Diary of Captain James Abbott, Assistant Resident, Huzara, from the 14th to the 24th April 1849.**

*14th April 1849—Srikote, Huzara*—Captain Holmes of the Irregular Cavalry stationed at Rawulpindi passed through Srikote yesterday toward the central parts of the district to seek for a site for a bungalow and a fitting situation for a sanitarium. The subject occasions me some uneasiness. Huzara is at present ruled without force, by the reverence of the people for the British Government. But the whole population is armed, and the army is estimated at 30,000. Some of the mountains, as those of Gundguri, the Kurrall and Dhoond country, are very strong and have cost the Sikhs much blood and treasure to bring into subjection, and under the Sikhs, in spite of a system of pillage the most shameful, this district was always a heavy burthen to the State. A hope of effecting a change has now dawned. The rents are lightened, the extortion has ceased, the country is flourishing and the people are contented and happy. In a few years they may forget entirely the old system of an appeal to arms, and every year the expense of Government will grow lighter. But the people are exclusively Muhammadans, not bigoted, but sincerely pious. As such they are sensitive of any intrusion upon their privacy, or of any open violations of the law of their Prophet. There are amongst them lawless and faithless men; but a blackguard is a phenomenon quite unknown. Their hatred to the Sikhs was based upon religious enthusiasm, their horror of idol worship, of eaters of the unclean beast and drinkers of forbidden wine. But the Sikhs in their indulgence seldom exhibit those spectacles which are to be seen in the neighbourhood of a British barrack. They were gentlemen in their cups, merry, talkative and boastful, but not absolute swine.

If, before obedience and order have grown into a habit in Huzara, the people are brought into close contact with our camps and barracks—to see there outdone every abomination which they had abhorred in their Sikh masters—it is scarcely possible that their respect for us should

remain unshaken and thus an effective and economic engine of Government were lost.

Moreover it is unfortunately too certain that a system does more or less obtain amongst even British officers of making up deficiencies in the vernacular by physical eloquence. The same persons cannot be taught to exercise ordinary precaution and will wander over the wildest mountains and amongst an armed population, who have had little acquaintance with law, unarmed and unattended. If it be remembered that the apprehension of a murderer in those mountains is quite impossible that the people cannot understand the importance of any person who travels lightly attended that they have time out of mind been their own avengers that they are excessively jealous of their women so that they will take arms to prevent the occupation of ground overlooking their habitations—I think it will be allowed that the sudden occupation of the Huzara and Dboond mountains by British officers were an experiment attended with much risk.

The sacredness attaching generally throughout our own provinces to the life of British officers is one of the secrets by which our empire is maintained and should be upheld by every means in the power of the Government. But if unlimited opportunity is afforded an armed population to retaliate by bloodshed affronts offered to their persons or their prejudices and if we be found powerless to avenge such murders, it is quite impossible that this sacredness should be maintained.

Notwithstanding the present submission of the tribes of this district to British authority, the whole have recently been in arms and fighting successfully against the garrisons which had controlled the country. For although these garrisons were induced by me when first I brought the mountain districts into subjection yet so implicit was my confidence in Chuttur Singb as Nazim of Herat (*sic*) until I got an insight into his secret proceedings that I had left the whole patronage of the district in his hands and thus every fort was governed by his creatures and one and all declared for him when he threw off the mask, and as the war might have become formidable could the Sikhs have retired upon Huzara as upon a country of which they hold the reins the mountaineers were ordered by me to blockade the forts and the garrisons, hopeless of succor evacuated them.

An attempt was made under the Sikh Government to disarm the people. But the task was not easy of accomplishment. The defenceless plains and valleys were deprived of their arms, and thus placed at the mercy of the mountaineers, but the latter retained a sufficient number to render them still very formidable to a weak Government, and their stock is now being replenished by the attempt made in the Rawul Pindi district to seize the arms of the inhabitants, causing the latter to send their arms by thousands to the mountains for sale there at a fourth of their value.

It may nevertheless, I think, be possible gradually to disarm the mountaineers, when they have full assurance that arms are no longer necessary for the protection of their rights, but this supposes an attention to that law of gradual progression by which order and peace are produced in the natural as in the moral world; and the avoidance of those sudden changes which invariably produce confusion and mischief in either.

If these arguments be deemed of weight, I would suggest attention to the table mountain of Nurr, overhanging the Jelum at the south of the mountain formation. It must be, I think, 6,000 feet higher than the sea's level, has abundance of water, of space, and of fir timber, and is, so far as I can learn, free from the fevers which hang about almost all the mountain summits of Huzara. It is about 40 miles east by north of Rawul Pindi, is crested with snow in winter and attained by a single gradual ascent from the plains.

The Kurrore mountain is of far less altitude, and I should doubt its being free from fever during the monsoon. It were, however, at other seasons an excellent sanitarium for those who could not reach Nuri, its distance from Rawul Pindi not exceeding 20 miles. I think, however, that both Europeans and Natives will be more healthy cantoned in the plains than in the mountains, resorting to the sanatoria only for occasional change of air.

Nurr and Kurrore being on the skirts of the mountain districts are less objectionable as regards the people of Huzara than other sites. They bring the army in contact only with a single and distant tribe, the Suttees, who have no sympathy with their neighbours.



If my arguments are deemed insufficient, there can be no doubt that the sites to be preferred are the spurs from the enormous mountains of Meean Jani ke Choki and Moochpoora, summits which must, I think, be nearly 10,000 feet in altitude. They are in the very midst of the wild country of the Dhoonds, an uncertain and warlike people and cut off from the plains and from the valley by vast tracts of the most rugged mountains.

The mountains of the Khaunpoor district adjacent to Rawul Pindi are all more or less infected with fever, during and after the monsoon.

Whatever may be the decision of Government, my best efforts will be made to give it effect, but I have deemed it my duty to record what appear to me objections and difficulties adding that, whatever two or three years hence may be the nature of our position in the Punjab any disaffection of the people of Huzara in the interim seems to me a contingency which it were worth some sacrifice to avoid and my belief that, if the people can for that term be rendered as happy as at present they are, a confidence in our Government will be begotten, which will resist even the spectacle of reeling drunkards and our addiction to the flesh of the unclean beast.

I went to-day on foot in pursuit of a tiger which has been doing damage in a neighbouring village but after a hard day's toil returned unsuccessful.

*15th, 16th, 17th 18th and 19th April 1849—Srikote*—The fort of Srikote is not yet quite finished my days are occupied as usual. My correspondence is finished by daybreak. After breakfast I hear and answer urzees until noon when kucherry is opened and lasts until sunset.

*20th April—Srikote*—Went after another tiger which had taken refuge in a cave, from which I found it impossible to dislodge him, having no fireworks at hand. The dogs went in but could not attract his attention. I fired in and hit him but as he could not be seen by looking into the cave I was obliged at last very reluctantly to light a fire in the mouth. Thus as I feared did not bring him out. He was stifled by the smoke.

*21st 22nd and 23rd April—Srikote*—Employed as on other days—in the morning in hearing and answering urzees and writing orders to the Kardars, and from noon to sunset in kucherry duties. A wild

report has reached Huzara and caused some stir amongst the disaffected. It was sent me from Moozuflurabad, and states that His Highness of Cashmere has taken alarm at our supposed designs and is secretly collecting an army for hostile purposes and sounding the neighbouring chiefs as to their disposition to side with him. I enquired of the Jumboo Vuqueel in my camp whether there be any stir in Cashmere. He replied that a neighbouring Prince, whose territories adjoin Gilgit, had shown hostile dispositions and that the Maharaja has assembled a force to overawe him. I do not wholly shut my ears to such reports, because it is just possible that the investigations of the Mooltan affair may have elicited evidence alarming to His Highness of Jumboo. I can imagine no other circumstance capable of shaking his friendly disposition at this season, and I conceive him far too wary to have committed himself by any tangible demonstration.

*24th April 1849—Sikote* —Engaged from morning until sunset in overhauling the accounts of the last eight months, which the flight of the accountant some months ago had thrown back. My dak is entirely cut off and I have no letter for about ten days.

J ABBOTT, CAPTAIN,  
*Assistant Resident*

The want of paper has caused me to write as little as possible from some time past. I have now received a supply.

**No 13 —Diary of Captain James Abbott, Assistant Resident, Huzara, from the 25th to the 30th April 1849.**

*25th April 1849—Sikote* —Finding that much excitement was occasioned by the presence of Goolam Khan, Chief of Huzara proper, at Hurkishengurh, where the want of drilled troops is ill-supplied by armed peasants who sympathize with prisoners of their own family and religion, I took opportunity of the acquiescence of the Officer Commanding in Attock to anticipate the permission of Lieutenant-Colonel Sir H. M. Lawrence and of the Officer Commanding at Rawal Pindi to lodge that Chief in the fortress of Attock, begging that he might be subjected to no hardship save such as safe custody renders inevitable. In fact the Vuqueel of Jehandad Khan was speaking openly of

persuading his master to make an effort to release Goolam Khan his friend, by force, and by a singular coincidence, which may have been more than accidental, Jehandad Khan entered Huzara with a considerable body of horse and foot the very day of Goolam Khan's removal, his plea being attendance at a marriage of one of his followers. I have rebuked him for taking such a liberty without first asking permission. I was kept a whole day in suspense as to his designs, but my party reached Attock with their prisoner unmolested. Engaged from morning to night with the public accounts of the last eight months.

*26th April 1849—Srikote*—Engaged until noon with the accounts, after which kucherry until sunset.

*27th April—Ghazi Kurri*—Marched to Ghazi in progress to Darchitli, where I am building a castle upon the estate of Goolam Mohy ooddeen Tarkhailee, one of the self exiled conspirators. My purpose is to ascertain where *chokies* will be necessary to keep in order the mountain of Gundgurb and also to acquire a thorough acquaintance with those localities which I have not heretofore visited in order to act without embarrassment in case a hostile visit be necessary. I have deferred this hitherto in order to carry on the all important repairs of the fort of Srikote. After noon held kucherry.

*28th April—Kurri Darchitli*.—Marched to Darchitli by the Bhong Durrah ascending by one of the most formidable approaches in the world, where one hundred good matchlocks might destroy the largest army of invaders. There is nothing so strong as this ascent on the Srikote side. Nara is nothing in comparison. Found the works of the castle pretty well advanced in spite of the distance of the water and of the stones used in construction. It is a most essential post commanding most of the strongholds of the Tarkhailee clan. At noon ascended Peer Than the principal summit of Gundgurb, distant about seven miles and returned by sunset. This summit is of blue mountain limestone rising out of a ridge of argillaceous schist permeated with veins of quartz, lime and mica. It possesses no water. The plunge on either side is extraordinary. A rifle ball might hit its mark in the plain below. My thermometer is not very trustworthy but I believe 3600 feet is nearly the true altitude above the sea level. Peer Than is the key to all the southern half of Gundgurb, the villages being sited upon its spurs. My

visit was necessarily brief, but sufficient I trust to put me in possession of the features for military purposes.

29th April 1849—Ghazi —Marched back to Ghazi held kucherry after noon

30th April—Torbaila, Huzara —Marched to Torbaila, where I am rebuilding the castle upon a small scale I was obliged to destroy it when the Sikhs were in rebellion lest it should fall into their hands Right opposite, the self-exiled traitors of Huzara have taken up their abode, and a castle is the cheapest means of checking their incursions. Indeed Torbaila can never be left safely without garrison as all the armed population beyond the river are lawless. The benefit of a fort over a cantonment is that the former costs yearly about the fifth part of the latter, in some cases not more than a tenth. Khan-i-Zeman Khan is at Khubul, and I see him through my telescope returning toward his retreat of Sitana He visited Khubul to bribe the people there to aid him in burning the crops in Huzara and Chuch by sending incendiaries across the Indus nightly upon inflated skins I shall urge Major Lawrence to re-occupy the fort of Pihoor, which commands the supplies of all the villages on the western bank of the river

J. ABBOTT, CAPTAIN,  
Assistant Resident.

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#### No 14.—Diary of Captain James Abbott, Deputy Commissioner, Huzara, from the 1st to the 9th May 1849.

1st, 2nd and 3rd May 1849—Torbaila, Huzara —Heavy rain these three days, which have rendered marching impossible During the rain I have been occupied with the accounts of the last eight months, some of which are still delayed owing to the confusion occasioned by the flight of the accountant When the rain ceases kucherry is opened to all who have complaints to prefer The fort of this place I was obliged to destroy after its surrender to prevent Chuttur Singh occupying it with a garrison as it could not have stood a regular siege I am now rebuilding it upon a much smaller scale, a mere castle in fact capable of holding the police *chokie* necessary at a point where the district comes in contact with the lawless tribes of the Mahabunn. There was formerly a garrison of 100 matchlocks here But I believe 25 will

now suffice and they may be reduced hereafter. The outlaws from Huzara have been parading on the further bank of the Indus, striving to persuade the wild tribes to join them. But I have threatened these tribes with the establishment of such restrictions as will render life a burthen to them if they aid the rebels.

*4th May 1849—Sohauhi*—I marched this morning about five miles up the Indus to see whether the old *chokie* at the Towie ferry would need re-establishment. I then struck off to the eastward by south and camped at Sohauhi, an undulating tract at the foot of the Sarde Mountain. Held kucherry as usual.

*5th May—Hurripoor*—Returned to-day to Hurripoor after an absence of 11 months some of the most anxious of my life. The country is in great beauty, the crops half ripe waving richly over plain and valley and contrasting strongly with the sterile mountains which shoot up as mere rocks all around. Yet those fertile tracts have been an eyesore to me for many months and the ruggedness of those mountains has been beauty in my eyes. I passed the fort of Barookote, which like that of Torballa I was obliged on its surrender to destroy, for the same reason. I had formerly here a garrison of 60. Fifteen will now be sufficient and the fort need not be rebuilt. The heavy rain although unseasonable has done little injury the season is one of the most abundant that has been known and even the ravages of the Dooranis have in many places been partly recovered by a second crop from the old roots. At Hurripoor the Sikhs destroyed all the barracks I had built, unroofed the jail and two of the towers of the town. But most of the Khuttreeshops remain. The fort has not been injured. It is a stout little place. With my property and that of Lieutenant Robinson at Hurripoor were some Government instruments which were taken (when the Sikhs plundered my bungalow) by Buksble Ruttun Singh, Chuttur Singh's Vuqueel. I presume he might be made to surrender them. Held kucherry as usual.

*6th, 7th, 8th and 9th May—Hurripoor*—I rise daily before day break, close my dak packet by sunrise, ride out, breakfast bear and answer urzees until noon and then hold kucherry until sunset. The examination and amalgamation of the accounts alone break in upon the

regularity of this routine    The daks continue to be very irregular, letters in some cases from Lahore being 14 days on the road

J ABBOTT, CAPTAIN,  
*Deputy Commissioner.*

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**No. 15 — Diary of Captain James Abbott, Deputy Commissioner, Huzara, from the 11th to the 26th May 1849**

*11th to 18th May 1849—Hurripoor, Huzara* — Nothing unusual has occurred in this period    My daily occupations are little varied    Much time is absorbed in the correction of the accounts, which from three different quarters I have found full of errors, not indeed of serious moment, but which if not corrected might render the accounts hereafter unintelligible    It will not appear astonishing that there should be such errors, but rather that any accounts whatever could be kept under the difficulties encountered    There being three different rupees in circulation, the chances of error are three-fold    From 11 A.M. until sunset daily I hold kucherry    During the late uproar several instances of assassination occurred amongst the mountains, the investigation of which is attended with difficulty.

*19th to 26th May* — I have no particular events to record. Lieutenant Robinson came in for two days to correct his portion of the accounts and again left Hurripoor to resume his survey operations in the mountains    I am detained here although anxious to visit the Kurral Mountains, because there is no other officer at hand to keep a check upon the movements of the outlaws beyond the Indus    So soon as Captain Nicholson returns to this neighbourhood, I purpose making a tour of the district to settle cases not easily decided at a distance    It would be my wish to be thus constantly in motion, because the summoning of evidence from a distance during sowing time and harvest, which occur twice every year, causes much distress to the people, and many cases are tediously deferred from the obvious injustice of making many suffer for the benefit of one    During the past week, I have held kucherry daily    I am still in ignorance as to the exact arrangements purposed by the Board for the Military Police of Huzara.

*P S* — I have to apologise for the length of period since my last Journal.

No 16.—Diary of Captain James Abbott, Deputy Commissioner, Huzara, from the 9th to the 15th June 1849

9th June 1849—*Hurripoor Huzara*—Whilst waiting for instructions regarding the formation of the Huzara Corps, I have determined to make a short tour of the district as the near approach of the rains will soon render this very inconvenient. I shall therefore start tomorrow morning. Held kucherry from 11 until sunset the early morning being devoted to the accounts which I have just received back from Lieutenant Robinson and to hearing and answering urzees

10th June—*Rujjooia*—Marched this morning to Rujjooia, 19 miles. Held Kucherry in the afternoon until sunset

11th June—*Rujjooia*—Halted to hear cases employed before noon in making up the accounts in hearing and answering urzees and from noon until sunset in hearing and deciding cases

12th June—*Nara Nullai*—Marched up the mountain to Nara Nullai not the Nara of Gundgurb. This is my first visit to Nara, which is a table mountain of clay slate and limestone one of the remote spurs of Meean Jani ke Choki. It is by my measurement about 5000 feet higher than the sea but my thermometer is rather incorrectly graduated. The climate is healthful and agreeable but the scenery is bare and wretched as is the case with most of the Huzara mountains Shirwaun, Dunna, Srikote, Sri Bungh Mari Junnoo Muh. Held kucherry from noon until sunset.

13th June—*Myra Numli*—Marched to Myra Numli a most fatiguing march over rugged and lofty mountains distance about 20 miles. The scenery greatly improves half way when the rugged precipices of naked limestone are exchanged for gentler acclivities wooded with fir oak yew, a tree called *minoo* resembling the elm, walnut, cedar, holly, sycamore and other trees and shrubs which delight an eye worn out with the aspect of the arid rocks that sentinel Huzara. Myra Numli are villages at the foot of mount Meean Jani ke Choki the loftiest mountain in the district, which I have never before found leisure or opportunity to visit but which I consider it my duty to ascend ere I send in the sketch map called for. The arrival of the drafts for the new regiment prevented me from starting earlier. Myra Numli has a small fort with a few police to man it. Although the elevation must be

nearly 7,000 feet, the temperature is scarcely pleasant, the valley being shut in by the ridge connecting the mountains Meean Jani ke Choki and Moochpoora. Held kucherry on the arrival after noon of my Moonshees.

14th June 1849—Mount Meean Jani ke Choki—Climbed to the summit of Meean Jani ke Choki, about 3,000 feet. The summit is of compact dark grey sandstone stratified. The spurs are of limestone and clay slate. This aspect of the mountain is rather bare, but the northern side has a thick forest of cedar, fir, oak, sycamore, the latter of great size and beauty, horse chestnut, *rousse*, here called *loome*, and other trees. The altitude by my thermometer is 10,000 feet, which is exactly what I guessed it to be, viewing it two years ago from a distance. It overlooks the whole of Huzara. The view is very fine. But these mountains want the peculiar charm of those about Simla, *vis*, an ever-blooming flora, an abundance of sparkling streams and interminable dells, which the eye is never weary of pursuing. I find the map constructed upon bearings and conjecture, without a visit to the main feature, essentially defective, and am glad I did not send it in previous to this visit. The air upon such a mountain cannot fail to be pure. The moon, which is diminished to a third of her full disc, appeared as distinct in the heavens at midday as at night. The water upon this mountain is not very abundant. I and my party drank the snow which was found in ravines on the northern side. The temperature disappointed me, being upwards of 80° in the shade. The air was pleasant and the sun, excepting for its glare, not offensive. I consider this mountain inferior to the Dhoond mountains as a locality for a sanitarium, being less accessible, more scantily furnished with water near the summit and affording fewer easy acclivities. I have elsewhere recorded what appear to me objections to the establishment of sanatoria within the mountains of this district for at least two years to come. Should these be overruled, I think the most suitable site will be found near the summit of a ridge which, commencing with Mount Murri, extends to Gurrial Gull above Fort Charian. The northern aspect will, I think, be preferred. This ridge is crested with a species of cedar called *paloodur*, bearing the foliage of the yew and affording timber equal, if not superior, to that of the larch. At about 500 feet from the summit the ground slopes easily so as to be often susceptible of culture



without terracing. The sides have a forest more or less thick of fir, pear trees, oak, etc. Water is generally abundant immediately beneath the steeper acclivity of the summit. The ridge belongs to the Dhoond country and is approachable from Rawul Pindi, either *via* Phoolgraon and Dunna or by Charian. By Dunna the first march from Phoolgraon carries the traveller to Dunna elevated about 5,000 feet, the second short march to Mount Murri. The ridge must be from 7 to 3,000 feet high. Snow lies very heavily for about four months. It fell when I was camped there with a Sikh force for four consecutive days, without intermission, commencing 25th November.

It has been the custom of the Dhoonda, Kurralls and Suttees to rise upon the garrisons of their country at every moment of visible weakness of the Government. On the last occasion they merely obeyed my order in rising. But the people are treacherous amongst themselves and the most dastardly assassinations are common. I cannot therefore think that whilst the Punjab is liable to commotions it were prudent to entangle our sick amongst these mountains or to encourage officers to build there. Mount Nurr is contiguous to the plains. The Suttees, its inhabitants have no sympathy with their neighbours, and a small detachment would always suffice to make the place secure during the absence of our troops from the neighbourhood. But amongst the Dhoond mountains the population is more numerous, the retreat more difficult the isolation from succor or supplies easily effected by the people, by seizure of the passes outward. Retreat at the commencement would betray distrust and weakness, and certainly cause a rising and unless the force there were considerable its danger might be great. The great tragedy at Cabul commenced with the murder of individuals, who with the fearlessness of Britons would wander unguarded amongst an armed population. The perfect impunity attending these acts in most instances led the people to regard a general massacre as a thing quite feasible. The sacredness attaching to British life in India was never established in Afghanistan for want of the commonest prudence. Yet we had not been many days in that country without discovering that the people thirsted for our blood. I would not dishonor the Dhoonds by comparing them with Afghans who are the lowest of mankind upon the moral scale. On the contrary, their feelings toward us at present are most friendly. That they may

never be otherwise, I would avoid tempting men so lawless beyond due bounds. On descending from the mountain the day was too far advanced to hold kucherry.

Marched down the Dohr rivulet to Duntour, and from thence to Nowa Shihir which, though of considerable elevation, has a hot wind. A Persian note, purporting to be from Ahmed Khan Sahib, having a few words of English scrawled upon it, amongst which was the name of Lieutenant Hamilton, begged me to report the arrival of that officer in Huzara for the information of His Highness the Maharaja of Cashmere.

J ABBOTT, CAPTAIN,  
*Deputy Commissioner*

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**No 17 —Diary of Captain James Abbott, Deputy Commissioner, Huzara, from the 16th to the 26th June 1849**

*16th June 1849—Nowa Shihir, Huzara*—Halted to hear causes; held kucherry from 11 A.M. until sunset, engaged previously in hearing and answering uizees. A Persian letter was brought me to-day purporting to be from Ahmed Khan Sahib (quasi Hamilton), stating that he had arrived from Cashmere with a guard which he was about to leave at Mahugul that he might proceed straight onward to Peshawur through Tunnole. A letter from His Highness the Maharaja of Cashmere accompanied address to his Vuqueel and saying that the Sahib Bahadur had been some time in Cashmere and was anxious to visit Abbott Sahib. Upon the borders of the first letter were scrawled "Lieutenant Hamilton proceeding to join his regiment at Peshawur, sorry I can't see you on the road. You must tell Molraj that I have arrived safely." The words were ill-spelt and the whole letter appeared to be anything rather than the production of a gentleman. However I thought it might possibly be some heedless, half-educated young fellow who might get into trouble from ignorance of habits of the people, so I sent him a purwana for a guard to accompany him to Attock and address a note to Lieutenant Hamilton hoping for the pleasure of his company should he pass my tent. At night I heard that he had proceeded on his way through Tunnole, but could learn no particulars of his conduct.

*17th June—Mahugul*—Last night I was wakened by my servant, who informed me that a Sahib was standing without. I dressed and went

forth and invited him into my sleeping tent whilst another was being pitched for his reception. He was a vulgar looking young man of two or three and twenty with light down upon his chin, a dirty towel wound around his head for turban and a suit of clothes of the black puttoo of Cashmere. He wore no shirt. His manners were of the lowest order of the barrack room, but he steadily affirmed that he was Lieutenant Hamilton of the 24th Native Infantry proceeding to join his regiment at Peshawur. I was perplexed how to act. Having invited him to be my guest I could not refuse him ordinary civility yet it was impossible to avoid the suspicion that a deserter from one of our regiments or a travelling apothecary sat before me. This morning I remained on the ground to offer him breakfast and put him through a cross-examination so far as I politely could. He took a long time to consider ere he answered the most ordinary question, said that he had been ordered to join General Gilbert a force at Peshawur had been up with two companies to Kangra and from thence had made his way through Cashmere had met Major Mackeson at Cashmere was sure his Corps the 24th, was at Peshawur that the Colonel's name was Robertson. Unfortunately I had no Army List to refer to. His manner at breakfast was in keeping with his conversation. He handled his knife like a bayonet, preferred a fork of steel for eating sardines and rice and drank his tea from the saucer. But suspicious as were all these circumstances I did not think myself justified in arresting or treating him discourteously without absolute proofs of ungentlemanly conduct. Finding that he purposed to cross the burning plains of Qatur and Chuch afoot I sent him a pony but had scarcely done so ere it occurred to me that if a deserter this might facilitate his escape. On arriving here where he spent a day, I find that his conduct at Cashmere was anything but decorous that he avoided Major Mackeson and lived upon His Highness the Maharaja whom he calls familiarly Molraj that his dress and cooking pots are the gifts of His Highness who was at last obliged to beg him to be gone. I have therefore written to Peshawur and to Captain Nicholson to ascertain if there be such a Lieutenant Hamilton in 24th N I and if not to take precautions for his apprehension. I held Lucherry to-day as usual on the arrival of my establishments. Mahugul, although lower than Nowa Shahr is cooler owing to the hot wind from Huzara (which rolls up the valley of the Dohr to the latter) being here shut out by the huge table mountain of Tunnole.

*18th June 1849—Mansera* —Marched to Mansera, where there is a rather large fort. Here the Sikhs under Colonel Bhoop Singh, one of the best and most worthy of the Sikh officers, yet deeply implicated in the late conspiracy, long held their camp, not having courage to attempt to force the pass outward where Lieutenant Robinson was posted with some thousands of matchlockmen. The pass is a footpath winding for miles over the tails of spurs from the huge mountains of Beerungulh and occasionally plunging into and emerging from deep ravines. Such a pass may be forced by an intrepid and cool body of Regular troops, and our matchlockmen gave little promise of offering a very resolute resistance. But it is ground peculiarly adapted to armed peasantry who have a thousand means of retreat if repulsed, and who under other circumstances can never be persuaded to stand; and as such I had at once selected it in preference to the Dumtour and Sulhud passes which the people of the country deem stronger and which have a more formidable look. The flank of a column threading this pass is exposed throughout its extent to the fire of an active enemy, and every spur must first be carried and occupied ere the column can pass in safety. The Sikhs held their camp at Mansera with little molestation excepting that their supplies were straitened. Lieutenant Robinson could not persuade his matchlockmen to venture within musket range. Had not Jhundur Singh, however, been sent to Huzara, the force would have laid down its arms and the rebellion would have been quashed. This we learnt from the intercepted letters of their officers. I held kucherry to-day as usual.

*19th June—Shinkiarz* —Marched to Shinkiarz at the head of the Pukli valley. Owing in the first place to my absence from Huzara whilst settling the boundary and afterwards to the rebellion it is long since I had visited Pukli. The whole surface of the country has been altered by culture and not a square yard of fallow or culturable soil remains unoccupied. Such is the effect of security. Thousands of emigrants have returned and there is a continual strife for land which has lain neglected for years. Held kucherry as usual.

*20th June—Shinkiarz* —Halted to try causes and settle disputes. Much oppression takes place in the Bogurmung valley, where I have no fort. The people who suffer dare not for their lives complain. I hope

to amend this by coming to live in this neighbourhood for several months in the year and by making constant visits to the valley. Employed during the forenoon with the accounts and from 11 A.M. until sunset in holding kucherry. The first storm of the monsoon occurred last night.

21st June 1849—*Mansera*—Another and heavier storm this evening. These storms give promise of a regular fall of rain, which the country has not enjoyed at the right season for several years. I marched back to day to Mansera. I have been endeavouring for some months to supply timber to Peshawur. But although there is abundance in Pukli the river Sirun will not admit of their passage downward for a space of about 15 miles and the portage is so narrow, difficult and dangerous that only the smallest timbers can be conveyed thereby. I have ordered a better road to be opened as I doubt not the supply from this district of timber to Peshawur will be deemed a matter of considerable moment by the Government. It is at present matter of the utmost difficulty to procure a timber in Huzara *see* at Hurripoor. The Dohr rivulet will waft them down but a short distance, both the Dohr and the Hurroh being exhausted by the canals of irrigation. I held kucherry as usual.

22nd June—*Mansera*—Halted here to hear causes. Last night my tents were blown away in the third storm. Occupied in the forenoon with the accounts and from noon until sunset in kucherry.

23rd June—*Mahugul*—Marched back to Mahugul where a letter from the Kardar of Khaunpoor met me announcing that Raja Hydr Buksh Khan, Gukka, was in open rebellion in the Khaunpoor mountains. I hope that it is a mere dispute between the Raja and the Kardar nevertheless very small openings of mischief are not to be neglected in Huzara which resembles nothing so much as a powder magazine. I therefore after a short kucherry marched on to Nowa Shahr and settled some disputes there.

24th June—*Chumba*—Marched to Chumba, engaged during the forenoon in hearing and answering urzees and afterwards until sunset in kucherry. A storm in the evening.

25th June—*Goolterie*—Marched to Goolterie, the seat of Goolam Khan Tereen, who is a prisoner in Attock. He is a clever fellow, for he has persuaded the women of his village to believe that he sacrificed himself for their safety whereas it is notorious that Dooranis entered

Huzara wholly on his invitation I had no idea that his place was so strong No Doorani army if opposed by a hundred matchlocks would venture to attack it, and he had 150 paid by me with unlimited promises of aid in case of attack. The old women of the place came in deputation to solicit his release.

At Mahugul a note from the Kardar of Huzara complained of the conduct of Lieutenant Hamilton Sahib, Bahadoor, who had been indulging in a daily ration of two bottles of country *arrack*, for which he would not pay, and had beaten several people without offence. I had previously warned the Kardar to inform Captain Nicholson should this person commit any irregularities, and Captain Nicholson on the Kardar's complaint has sent a party to arrest him, having discovered that there is no Lieutenant Hamilton in the 24th N I. Here Raja Hydur Buksh, whom I had summoned, met me I shall, however, go on to Khaunpoor as there must be something essentially amiss either in the Raja's or in the Kardar's conduct.

Held kucherry as usual ; was caught on the road by a heavy fall of rain

26th June—*Chujja*.—Climbed the mountain to the little fort of Chujja, 5,500 feet high, between two enormous rocks of blue mountain limestone, thinly sprinkled with shrubs belonging to the mountain called Sri Bugh, which is of the same character, but probably 1,500 feet higher.

Nothing can be more wretched than the mountain despite its pure air and genial temperature I have never before visited this castle, which I had built when first I settled the district. The post is important, overawing Goolterie and part of Khaunpoor. A note last night from Captain Nicholson informed me that he had secured Lieutenant Hamilton who upon the threat of rougher treatment had confest himself to be one Kielly from the Depôt of H M's 61st Regiment at Jullundur anxious to rejoin his corps at Peshawur without incurring the penalties of desertion I must not forget to record that this man confirms the reports I had heard of His Highness of Jumboo having concealed the greater number of his guns on Captain Mackeson's approach. He says that there are 600 guns at Cashmere

J. ABBOTT, CAPTAIN,  
*Deputy Commissioner*



PESHAWAR POLITICAL DIARIES,  
1-17 AUGUST.





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No. 1.—Political Diary of Major George St. P. Lawrence,  
Principal Assistant to the Agent to the Governor-  
General, North-West Frontier, at Peshawur, from  
Sunday, the 24th, to Saturday, the 30th January 1847.

25th January 1847.—Arrived at Wuzzeerabad visited the camp of  
Colonel Ruttun Singh, who said that not more than 100 of his regiment  
had arrived, and that it would be 26 days before all were present.  
He had heard a rumour of Batta beyond the Indus. In the evening a  
Jemadar, Azimootoolah Khan, late of the 4th Troop, 2nd Cavalry, now  
of the Govind Regiment, called on me, and from him I heard that his  
regiment would be complete in four days, and that more of Colonel  
Ruttun Singh's regiments were present than represented, also of the  
other Sikh Regiments, Colonel Meer Jung Ah (*sic*), though the Colonel  
had not arrived, the Jemadar is anxious to accompany me to Peshawur.

26th, 27th, 28th January.—Nothing    Marched to Goojrat on the  
27th, heavy rain    Marched to Khairian, rain    received a petition from  
certain villagers that Moortazah Shah had fined them Rs. 50 for a  
robbery on some traders and otherwise ill-treated them.

29th January.—Arrived at Jhelum; received several petitions: for-  
warded them to Lahore

30th January.—Arrived at Ruttian, distant four *coss* from Rhotas,  
which I visited *en route*    Goman, zemindar of Kokur, brought a petition  
against Wuzzeer Mungul Singh of having fined him Rs 1,008, which  
petition he had submitted to the Resident, Lahore, who referred to Fakeer  
Churaghooddeen, who passed an order that Missar Roop Lal, Kardar  
of Rhotas, should investigate it, he declining to do so, petitioner has  
come to me    I have referred him back to Roop Lal, and then to  
Lahore, should he still decline obeying orders

GEO ST P LAWRENCE, MAJOR,  
*Principal Asst. to the Agent, G-G, N-W F,*  
*in progress to Peshawur,*

No 2.—Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor-General, North West Frontier, at Peshawur, from Sunday the 31st January, to Saturday, the 6th February 1847

*31st January 1847* —Marched to Dhurmak. Heavy rain all night

*1st February*—Marched to Mimikwalla. Sirdar Chuttur Singh looks as if he had been and is very ill. Told him that it was said that his son Sirdar Outar Singh at Peshawur oppressed the people he replied that orders would be sent that all my wishes should be attended to. Mr Apothecary Thompson prescribed for him. The Sirdar presented Rs 600, a horse and sundry trays of shawla etc. Heavy rain all night.

*2nd February* —Marched to Rawul Pindce, consulted with Dewan Jowala Sahai and by his advice wrote to certain zemindars to come in and meet us sent the letters accordingly have agreed to halt four or five days

*3rd February* —Messrs Agnew and Lumsden arrived at 11½ AM from Huzara, they represent that the people are all willing to tender allegiance to Maharajah Golab Singh on his guaranteeing to them what they held in the time of Sirdar Hurree Singh. Held a long consultation with Dewan Jowala Sahai who agrees to give sunnuds on behalf of his master Golab Singh, to all who will come in, guaranteeing their Jagheers and *rhasut* as held in Hurree Singh's time. The brother of Ameen Khan chief of Puckley came in with the gentlemen with whom he had done good service, and was introduced to the Dewan, who promised all he asked. General Kahn Singh's troops are to arrive on the 5th

*4th February* —A long consultation with the Dewan, who gave in our presence the Maharajah's sunnud for Ameen Khan to his brother who took his *raksut* to shew it quickly to the Hill people as a proof that the Dewan was empowered satisfactorily to arrange their affairs. We hope much from this

*5th February* —General Kahn Singh's troops arrived this morning. The General with Sirdar Golab Singh, Attariwalla, and the Commandants and Staff of Corps paid me a visit. I told them that Lieutenant Lumsden had reported most favorably of their good service, which should be made known at Lahore where every endeavor was being made for the

good of the old soldiers of the State, etc ; that they must exert themselves to put down the system of plundering the villages, etc. They left seemingly well pleased ; I am to see them on parade to-morrow. Held a long consultation with Dewan Jowala Sahai. Gama Khan of Tomar and the Suttee zemindars have come in. He says if I will only help him a little longer, all will come. While talking, the Resident's letters to the Maharajah and Dewan arrived ; I handed them over, and he read them aloud and begged I would represent his entire devotion to us and willingness to be guided by us. I must do him the justice to say that he seems most anxious to do his best for the settlement of the country, and most willing to act up to all our suggestions. Many complaints have come in against the Sikh Troops the General, at my request, has placed safeguards in the villages

6th February 1847 — Inspected the Troops of General Kahn Singh, and expressed my gratification at their soldierlike appearance. Those for Lahore will march on the 10th and for Peshawur on the 11th instant ; they require some rest. Dewan Jowala Sahai brought the Nawab Hyder Buksh, Soobha of Kanpooi, with a zemindar, the Nannu of the Suttees (*sir*), the latter returns with one of the Guides to bring in others and intelligence. Sindar Golab Singh represents that Sirdar Bhoor Singh's Horse have not had pay for five months

GEO. ST. P. LAWRENCE, MAJOR,  
Principal Asst to the Agent, G-G, N-W F.

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No. 3.—Political Diary of Major George St P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 7th, to Saturday, the 13th February 1847.

7th February 1847 — Dewan Jowala Sahai suggests that the four Kohistanee Regiments in the Sikh service about to be disbanded on return from Huzara should be transferred to Maharajah Golab Singh, in a note of yesterday to the Resident I suggested the same

8th February — Rained hard all last night and all day, which will delay our march which we had settled for to-morrow, the ground being too slippery for camels. Heard from General Kahn Singh that his forces



were directed to lodge their arms at Rhotas I complimented him on there being no complaints of plunder for the last three days, and hoped the same good order would attend his march to Lahore he replied that if Sirdar General Golab Singh's troops did not march at the same time he would guarantee it.

9th February 1847 —Dewan Jowala Sahai agrees that the number of Kardars in Huzara shall be reduced to four or five Messrs Agnew and Lumsden represented to him that they only oppressed the people and forced them into rebellion

10th February —General Kahn Singh's four regiments marched towards Lahore. A Kohistanee Regiment of Sirdar Sher Singh's with four guns all under command of Sookh Singh, remain at Rawal Pindee pending orders from Lahore as to the Kohistanee Regiments being transferred to Maharajah Golab Singh or not the carriages of the guns are under repair Sirdar General Golab Singh wants 15 days leave to visit his father and thence to go to the capital.

12th February —Marched from Rawal Pindee to Janetteke Sung on taking leave of the Kardar of Pindee, I held a quiet conversation with him as to his treatment of those under him

13th February —Marched to Kalley ke Serai a news-letter from Peshawur of the 11th announces the death on the 4th at Jelallabad of Sirdar Mahomed Akbar Khan the news-writer it is said may be depended upon

GEO ST P LAWRENCE MAJOR  
Principal Asst to the Agent, G G N H F

**No 4.—Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor-General, North West Frontier at Peshawur from Sunday, the 14th, to Saturday the 20th February 1847**

14th February 1847 —Marched to Hussan Abdall Futteh Khan, Chief of Gaybi presented Rs 100 He had taken refuge in Huzara from the persecution of Dewan Moolraj sent his case to Lahore and told him to accompany Mr Agnew to Hurlishengurh till an answer should arrive and the Dewan Moolraj not to molest his family till then. Mr

Agnew accompanied me to Hussan Abdall with a view to our meeting the Gundghur Chiefs and, if possible, putting a stop to their plundering the road, etc. They (five) came to us and sat three hours, their demands are great, but we hope to reduce them. I sent them to be fed and housed by the Kardai accompanied by one of my own men, but they sent back word that they preferred catering for themselves. I sent them Rs 50. Their looks do not belie their present vocation. The arrival of two akhbais from Peshawur and the brother of Ameenollah Khan at Peshawur, confirm the report of Sirdar Mahomed Akbar Khan's death. Nawab Zeman Khan is likewise said to be dead; he befriended the Cabul hostages.

*15th February 1847* — At a long interview with the Gundghur Chief it was settled that a paper of grievances should be forwarded to Lahore, they refraining from all acts of plunder till an answer reached them through Mr Agnew at Hukishengurh they appear most willing, if they get subsistence from the State, and absolution for the past, to give up marauding. They have Sikhs, Hindoostances and Afghans in their gangs—all these they engage to discharge. They plunder the whole line of country from the Margulla Pass to the Attock the Kaidars plead inability to prevent them from want of force; the nature of the country is favorable for marauding, being jungly and raviny. We parted from Mr Agnew at 12 o'clock, he halting for the day and we starting for Kootuha. It rained heavily all night. Lieutenant Lumsden and I inspected the ground about Hussan Abdall, to the north there is a good high plain well adapted for troops; that occupied by Sirdar Bhoor Singh's house is very objectionable, being commanded in front and flank by high ground. I consider Hussan Abdall, in a military view, a better location for troops than Rawal Pindce, it is only said to be unhealthy for two months in the year. Marched to Kootuha.

*16th February* — As I was about to march from Kootuha, General Golab Singh arrived with a few men, and said one regiment would join me at Khairabad, if I would halt to-morrow. Agreed. Three or four miles from Attock at Cazeabad passed through the camp of Colonels Boodh and Buhadur Singh. These gentlemen rode with me for some time. The whole of the zemindars of Chuch in the Kardarship of Asa Nund beset me at their several villages, shrieking forth their grievances and followed me to the river, where they were stopped, said to be by Asa Nund's

orders I sent and had them crossed over. A portion of the urzees I have sent to the Resident; many may be frivolous and groundless, but when a people come forth *en masse* to complain in this manner there must be something radically wrong. As my time would not admit of investigating their complaints I would suggest that either some one be sent from Lahore to do so or they and the Kardar be ordered to Peshawur. Near the ruins of the old city of Attock, from the window of a large building on the right of the road hanging by the neck the body of a man in a decomposed state, said to have been a robber by some, by others late a servant of the Killadar Sirdar Bhaug Singh. Inspected the fortress, which is a large straggling place admitting of troops being brought close under its walls and capable of little resistance to guns of any calibre—the walls are of stone in parts ten or twelve feet thick the upper defences not more than two or three feet in the upper part of the fort are two bastions for guns and a semi-circular battery in the centre facing the river in the lower only one point where six guns might be placed. There are only three guns in the fort, two kutchra powder magazines one in the upper and one in the lower; a sally port at the west end leading to the river from whence water may be brought without exposure to fire from without there are some water wells within the fort. A portion, the largest of the town, is on the south side without the fort close under the walls. On the opposite bank of the river the Fort of Khairabad, of stone, completely commanded from the heights in its rear, on which there are three small towers, it was washed away by the great flood of 1840. Attock is held at present by a garrison of 5 or 600 matchlocks, it would hold at least 5,000 and to man its walls would take at least that number.

17th February 1847—Halted. General Golsh Singh with one regiment marched this morning. Complaints flocking in from the district of Chuch. Colonel Ram Dass from Peshawur met me, having been deputed by the Governor.

18th February—Marched to Alhora. Many urzees received; the people will not believe that the British are not the rulers of the country though I have it explained a dozen times a day.

19th February—Marched to Puhbee. More urzees and the villagers here brought them with fire on their heads, in presence of the Bukshee,

Chowdhy and Kazee of Peshawur; the complaints of oppression are grievous. The whole road from Attock is lined with a succession of chowkees, occupied by 300 footmen, under Kumurooddeen Khan, who is said to have 200 horse under him also.

*20th February 1847*—Entered the city of Peshawur in state with the Governor, Sirdar Uttar Singh, the Barukzye Sirdars, General Goordut Singh, Mehtab Singh, John Holmes, etc., etc. Inspected Goordut Singh's troops at Chumkunnee on passing—then march is delayed for want of carriage, so say the authorities. Paraded through the city to my tents under the Fort of Shahmicee Ghur. My arrival has caused great excitement, the whole city poured forth its inhabitants, who, unawed by the Sikh authorities, welcomed me with acclamations and shouts for justice! The report of Sirdar Mahomed Akbar Khan's death is quite true; the Ghilzies are in rebellion, and the whole country disturbed.

GEO ST P LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G-G, N-W F.*

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**No. 5.—Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 21st, to Saturday, the 27th February 1847**

*21st February 1847*.—I sent for General Goordut Singh and enquired why he did not march. Want of carriage. I recommended that he and his troops should leave all baggage in excess of actual necessities, such as merchandise, and under a guard to follow, that I had in the morning seen no less than 18 camel-loads of almonds at his house, he promised compliance. I deeply regret that one of my first acts should be turning a deaf ear to the complaint of merchants, ninety of whose camels have been seized to expedite the march of these troops. I could only direct the Bukshee to pay them their hire to Rawal Pindie, and promise to write then to the Kardar for them to be relieved. 18 camels seized by Goordut Singh belonging to Naib Mahomed Shureef, the Sirdar wrote to the General to give them up, but he answered "that his men would not let him." Notwithstanding my orders, the General did not prevent his men and others destroying their cantonment, pleading the same excuse of inability to restrain

them he seems perfectly reckless and I trust the Durbar will make an example of him. Complaints are pouring in faster than three moonshees can read them. The Sirdar entertained my camp yesterday I declined it to-day, he is a lad of 15, entirely led by those about him the Bukshee being the head who is represented in glowing colors as a cruel oppressor of the poor. I rode through the cantonment with General Golab Singh—all the ground has been cultivated by the officers and men and the vacant lines are in ruins.

*22nd February 1847*—General Golab Singh reports the arrival of his troops. The Sirdar at my desire wrote to General Goordut Singh directing him to march, leaving his heavy baggage behind under a guard, without effect. He marched carrying all. I held a Durbar at which the Sirdar presented all the civil and military authorities, who presented nuzzurs. Crowds of complainants throng my tent from morning to night. Sent for Colonel John Holmes who says his duty in the city is solely to keep the peace, sending all who act in breach of it to the Sirdar. Sent for the Morning Reports and Disposition Returns of Regiments.

*23rd February*—I called at 8 A.M. on General Golab Singh, circulated a proclamation with the Sirdar's approval to the effect that no complaint beyond a year would be attended to that all petitions should first be made to the Sirdar and if not attended to brought to me when I would, in concert with the Durbar authorities investigate them, punishing all false complainants that the urzees shall be of a certain size with date, name of parties etc, etc. It had greatly eased the minds of all in authority who quaked for their old offences. Colonel Ram Dass, Kardar of Kuttuck against whom there are at least sixty petitions, is trying to settle them by paying half and taking razeenamas.

*24th February*—At 4 P.M. yesterday Lieutenant Lumsden accompanied me to return the Sirdar's visit. General Golab Singh and Melitab Singh with Regiment Commandants and the civil authorities met us we sat an hour and passed compliments. I then presented the Sirdar with a gold watch and chain he giving us khilluts. He then showed us all over the Gor Khuttry telling us he would be happy if we would occupy either the whole or any part of it. On going and returning

we passed through the principal streets of the city, the Bukshee, Chowdry, and all the Generals escorting us back to our tents. My proclamation of the 23rd appears to have tranquillized the minds of many, both high and low, the former as freeing them from being called to account beyond a year, the latter, disabusing their minds of the idea that I was about to assume the reigns of government. One petition brought to me stated that now the *raj* of Sikhs was at an end, the Mahomedans hoped they might call the *azans* loudly! I have offers from all sides of service from old retainers of Major Mackeson, but I declined all, saying my orders were to have nothing to do with relations beyond the Sikh dominions. Bukshee Jawahur and the Cazeer called to show that they were settling many complaints. It is said the Bukshee is trying to get razeenamas from the people, promising to cease oppressing them.

*25th February 1847*—Intelligence from Cabul is that Ameer Dost Mahomed Khan has reached Jellalabad; that the late Sirdar Mahomed Akbar Khan left his property to his brother Hyder Khan and his sword to Mahomed Afzul Khan, and directed his body should be taken to Khoolloom. The Afghans are represented as in a state of alarm, conceiving my arrival forebodes our approach to Cabul. I have received several letters from the Khyber Chiefs, but have assured them we have no call for their services. I take every opportunity of making this known. In concert with the Sirdar and General Golab Singh, Poonindia, I have ordered a parade of all the Khalsa Troops for to-morrow, and requested the Sirdar to send all the Ramgoles (Irregulars) off duty. I have not fixed upon a residence yet, the Fort is objectionable as excluding the free ingress of petitioners, the Generals represent the Wuzer Bagh as too distant from the cantonment, which it certainly is, to admit of that close supervision of the troops and attention to their affairs which the Governor-General's minute points out as my first object. They say that a portion of General Avitabile's house, now occupied by the Sirdar Uttur Singh, might be well spared and portioned off for our accommodation, the Sirdar and his people only occupying a part of the upper story. They all profess great pleasure at the idea of my taking up my abode there, I doubt them.

26th February 1847 — Last evening called on the Sirdar and with him went over all his house late General Avitabile's, which certainly might be divided off for us both, without putting the Sirdar or his followers to any inconvenience. The parade this morning went off most orderly and correctly the force looked well under arms. It wants guns and cavalry much a return I hope may accompany my next diary. General Golab Singh is most attentive and calls almost daily. I have issued two more *ishtihars*, copies I have sent to the Resident, they appear to be well received.

27th February — Visited Sirdar Peer Mahomed Barukzye, and went over one of his houses to see if it would suit us. don't think it will. He presented me with 15 trays of fruit and two horses, his brother, Sirdar Syed Mahomed Khan presented three trays and one horse. The authorities say they have no money to pay the Ramgoles (Irregulars) the Bukshee is to visit me to-night to explain why. I have just had the duffrys with me who make out the arrears due to be Rs 1,62 521 2 14 (*sic*), nearly four months pay.

Geo. St. P. LAWRENCE MAJOR,  
Principal Asst. to the Agent, G. G., N. W. F.

No 6—Political Diary of Major George St. P. Lawrence,  
Principal Assistant to the Agent to the Governor  
General, North West Frontier at Peshawur from Sun-  
day, the 28th February to Saturday the 6th March  
1847

28th February 1847 — I transacted no business to-day beyond receiving the returns of the army from General Golab Singh and giving him the draft of a general order to issue to the troops, calling upon them with reference to the new order of things to pay prompt attention to orders, respecting their officers, and explaining how their complaints were to be made and attended to. That the parade ground which has hitherto been cultivated up to their very huts should revert to its proper state all cultivation to cease. Have fixed for my residence an old *mukbu* to the left of the lines, close to General Golab Singh's residence. It is much out of repair, but its proximity to the troops will enable me both to carry out the Governor General's wishes that my first object should be the care of them and the reconciling them to the change of station. The General is highly pleased at my resolution and offered me

house, which I declined, telling him he had done more than enough in giving me the *mukburah* hitherto occupied by his retainers, and used by General Goordut Singh as a workshop. Dureah Khan, who escaped from Umritsur, is reported to have arrived near this. I have given out that if he gives security and comes in, he will be pardoned. His Fort is within eight *cos*s of this. Accounts from Cabul and Jellalabad represent the Afghans to be much more than usually divided among themselves, the eastern Ghilzies trusting to none but their respective chiefs, Azeez Khan, Khoda Buksh Khan and Mahomed Shah Khan, all at issue; Ameer Dost Mahomed Khan at Jellalabad trying to get them in to himself and to adjust their discords ineffectually. Grain of all kinds is very cheap. A sepoy of the Jamrood Garrison is reported to have been murdered by the Afreedees. Two went out to a mill to grind atta; were attacked, one escaped, one fell.

1st March 1847 — Mustered the Corps of Guides under Lieutenant Lumsden, changed ground from the Fort to the cantonment, passing all the day at the Sirdar's with Lieutenant Lumsden in settling complaints, the young Sirdar sitting on his chair next me, listlessly watching the *ghurni*, and giving his seal when required, replying when asked his opinion on a case, "Certainly, what you please," "As you think proper", and more work was got through than the Sirdar has done in the last week. I caused to be released a prisoner who had been confined six months on suspicion of theft, accused by the lover of his wife, with whom she has been living eleven months, on making her over to the husband, the lover produced a receipt sealed by the Judge of the Adalat for 21 rupees, the price he declared he had paid for the lady! The Judge declared it was fine for criminal conversation, but receipts are not given by the Court for fines. On asking for the register to see if the Sirkar had been credited, a fresh entry was apparent! I further abolished the monopoly of *marda*, which Sardar Shere Singh had established, two shops paid 1,300 rupees per annum to the State for it, the revenue thus accruing in no way compensatory for the odium of so unjust and oppressive an act. The settlement of these two cases was hailed by the assembled multitude with shouts of applause, our passage through the city was in like manner loudly greeted and our justice invoked *far* and *near*. I had a long conversation with the young Sirdar's deputies as to the mode of settling the complaints and preserving their *purdah*, with other matters connected with the



administration I asked General Golab Singh to be present, which he was, and aided us with his advice and experience he is well disposed to assist me in everything as is also his son Colonel Uttur Singh who is shrewd and intelligent

*2nd March 1847*—This being the last day of the *Holee*, the Sirdar sent to say he wished to *pooja* and hoped we would not go to the Gorkhuttry I therefore heard complaints at my tent. In the evening General Golab Singh came with the Bukshee and Chowdry and begged for a private interview the two latter were in a great state of alarm and it was with much difficulty I got them to speak they first solicited pardon for past offences, promising future amendment They then stated that my coming had raised the whole populace against them who were loud in complaints that they dare not leave their houses and their orders were unattended to that their lives were not safe that they had only been in office six months that my enquiries extended to 12, how could they answer for Shere Singh's period that many acts had been done both which were allowed by the Khalsa but not by our laws that fines of all degrees were imposed some of which went to the Sirkar and some to themselves and other Generals and that they were ready to give up their own share of the spoil, but how could they do so with that of the Sirkar and Generals and much more to the same purpose that they had time to arrange with the complainants, and had with some, but the most were so unreasonable even demanding interest, that it was impossible to do so that I alone could save them and their master the young Sirdar from disgrace that whatever I wished they would do now and for the future and I pacified them as well as I could, urged them to settle as much as possible and that I would do my best both for them and the petitioners There can be no doubt that much oppression has prevailed, but then it should be remembered that a year or six months since it was little thought that they would have to render a strict account of all their deeds. Some allowance must therefore be made for the authorities more especially as they only followed the custom of the country Reports from Afghanistan are that Ameer Dost Mahomed Khan is at Jellalabad with 6000 men, and has sent some Jezailchees into the Khyber this has alarmed the authorities here not a little They say that a lakh of *Bundook* can be raised in this province, and all would be happy to rise against the Sikhs and for what purpose has the Ameer come to

Jellalabad? It is said that Mahomed Shah Khan, Ghulzie, has secured eight lakhs of rupees of his late son-in-law, Mahomed Akbar Khan, with which he has fled to his own Fort, and will not join Ameer Dost Mahomed Khan, saying he depended on himself alone. Sudars Peer Mahomed and Syed Mahomed, Barukzyes, with their sons and nephews, called on me, and after mutual compliments and their expression of joy at my arrival and the benefit it was to the country, Sudar Peer Mahomed said that he was our servant for ever—all he had was ours, that his two guns at Kohat or his elephant was at my service, etc., etc. I rode in the morning to inspect the Shah Dind cantonment opposite the Lahore Gate, in which is located the Khas Rissalah and Khas Regiment. Colonel Ram Dass, Kardai of Kuttuck, has brought razeenamas with the zemindars, who have certified to their correctness.

31st March 1857 —Rode to the cantonment of Bukshee Kishun Singh, formed 10 months since by Sirdar Shere Singh for Rajah Soochet Singh's regiment, and now occupied by only a company of Ramgoles for its protection. The zemindars about bitterly complain of the formation of the cantonment, and the oppression they experienced from the sowars and officers of the Khas Rissalah, who cultivate the ground on their own account, and that Bukshee Kishun Singh, Commandant of Soochet Singh's regiment, has left his *Motbar* to realise the produce of the zemindar's land. I find Colonel John Holmes some time since reported to the Durbar the seizure of land by General Goordut Singh, who was ordered to give it up, but never did. The Custom officer at Attock has given General Goordut Singh a razeenama for the amount of duties levied on the merchandise he and the officers with him took from this, but has not inserted the amount each received. The treasury here is empty, had not 700 rupees to pay back an unjust fine levied on a village in which an old woman hung herself. The fines that have been imposed on all classes here are fearful, and most seem to be *ad libitum* and accruing to the party adjudicating, not to the Sirkar.

4th March —Received a letter from Taj Mahomed of Cabul enclosing many certificates from officers of service performed, and offering to do any we might wish, replied that I was aware of his good service, but we required nothing done at Cabul, etc. I have sentenced two jemadars and four sepoyes of Ramgoles to be discharged the service

administration I asked General Gulsh Singh to be present, which he was and aided us with his advice and experience he is well disposed to assist me in everything, as is also his son, Colonel Uttur Singh who is shrewd and intelligent

2nd March 1847—This being the last day of the *Holee*, the Sirdar sent to say he wished to *pooja* and hoped we would not go to the Gor Khuttry I therefore heard complaints at my tent. In the evening General Golsh Singh came with the Bukshee and Chowdry and begged for a private interview the two latter were in a great state of alarm and it was with much difficulty I got them to speak they first solicited pardon for past offences, promising future amendment They then stated that my coming had raised the whole populace against them, who were loud in complaints that they dare not leave their houses and their orders were unattended to that their lives were not safe that they had only been in office six months that my enquiries extended to 12 how could they answer for Shere Singh's period, that many acts had been done in both which were allowed by the Khalsa but not by our laws, that fines of all degrees were imposed some of which went to the Sirkar and some to themselves and other Generals, and that they were ready to give up their own share of the spoil but how could they do so with that of the Sirkar and Generals and much more to the same purpose that they had time to arrange with the complainants, and had with some, but the most were so unreasonable even demanding interest, that it was impossible to do so that I alone could save them and their master, the young Sirdar from disgrace that whatever I wished they would do now and for the future and I pacified them as well as I could, urged them to settle as much as possible and that I would do my best both for them and the petitioners There can be no doubt that much oppression has prevailed, but then it should be remembered that a year or six months since it was little thought that they would have to render a strict account of all their deeds. Some allowance must therefore be made for the authorities more especially as they only followed the custom of the country Reports from Afghanistan are that Ameer Dost Mahomed Khan is at Jellalabad with 6,000 men, and has sent some Jezailchees into the Khyber this has alarmed the authorities here not a little. They say that a lakh of *Bundook* can be raised in this province, and all would be happy to rise against the Sikhs and for what purpose has the Ameer come to

Jellalabad? It is said that Mahomed Shah Khan, Ghilzie, has secured eight lakhs of rupees of his late son-in-law, Mahomed Akbar Khan, with which he has fled to his own Fort, and will not join Ameer Dost Mahomed Khan, saying he depended on himself alone. Sirdars Peer Mahomed and Syed Mahomed, Baiukzyes, with their sons and nephews, called on me, and after mutual compliments and their expression of joy at my arrival and the benefit it was to the country, Sirdar Peer Mahomed said that he was our servant for ever—all he had was ours, that his two guns at Kohat or his elephant was at my service, etc., etc. I rode in the morning to inspect the Shah Dund cantonment opposite the Lahore Gate, in which is located the Khas Rissalah and Khas Regiment. Colonel Ram Dass, Kairat of Kuttuck, has brought razeenamas with the zemindars, who have certified to their correctness.

3rd March 1847 —Rode to the cantonment of Bukshee Kishun Singh, formed 10 months since by Sirdar Sher Singh for Rajah Soochet Singh's regiment, and now occupied by only a company of Ramgoles for its protection. The zemindars about bitterly complain of the formation of the cantonment, and the oppression they experienced from the sowais and officers of the Khas Rissalah, who cultivate the ground on their own account, and that Bukshee Kishun Singh, Commandant of Soochet Singh's regiment, has left his *Motbar* to realise the produce of the zemindar's land. I find Colonel John Holmes some time since reported to the Durbar the seizure of land by General Goordut Singh, who was ordered to give it up, but never did. The Custom officer at Attock has given General Goordut Singh a razeenama for the amount of duties levied on the merchandise he and the officers with him took from this, but has not inserted the amount each received. The treasury here is empty, had not 700 rupees to pay back an unjust fine levied on a village in which an old woman hung herself. The fines that have been imposed on all classes here are fearful, and most seem to be *ad libitum* and accruing to the party adjudicating, not to the Sirkar.

4th March —Received a letter from Taj Mahomed of Cabul enclosing many certificates from officers of service performed, and offering to do any we might wish, replied that I was aware of his good service, but we required nothing done at Cabul, etc. I have sentenced two jemadars and four sepoy of Ramgoles to be discharged the service

and imprisoned for one month, one of the former for ill treating an Urbob and the latter for a most unjustifiable assault on one of my chuprassees; hope this will have a salutary effect on the rest of this very disorderly crew. From the Fort of Futtehgurh it is reported that three prisoners, Afreedees, taken up for the murder of a sepoy cannot be brought here for trial under fear of a rescue, that they cannot send a sufficient guard with them lest the Fort be weakened. I have ordered a strong party to be detached from the Ramgoles in the city to bring them in. Rode through the city in the evening.

*5th March 1847*—It is said that a party of 20 Horse has arrived in the city from Cabul seeking service. Lieutenant Lumsden has had fever for some days, though he continues to work during the day and drill his Guides in the morning he is most active and useful. I have not yet been able to get a sight of the Peshawur accounts am told they are being written out afresh with a view to show all square the authorities affirm that the delay is caused by the non arrival of Kardars. The Khyber is closed to Kafilas they take the lower or Tartarah road paying toll to the Momunds Re 1 per horse, 8 annas per man and loaded camels 4 rupees. Hearing that the authorities did not like our going to the city to investigate complaints we have ceased doing so making my tent the court, and having either the Bukehee or Chowdry present, the Sirdar doing his part by such as we brought before him which are comparatively very few. I do my best to keep his and the authorities *purdah* but it is most difficult.

*6th March*.—Sirdar Peer Mahomed expresses himself greatly pleased at my having written to his brother Sirdar Sultan Mahomed to come to Peshawur. He offered me his two guns or elephant, and I told him I would borrow the guns for a time, as we had but few here. I gave him and Sirdar Syed Mahomed khilluts on taking leave. If words are to be believed they are our friends, our coming has certainly improved their position in *razut* etc. The young Sirdar sent to know if he can make to-morrow a *role tateel* as we did. I replied he might please himself in every way, etc., etc.

GEO ST P LAWRENCE, MAJOR,  
Principal Asst to the Agent, G G, N-W F

No 7—Political Diary of Major George St P Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 7th, to Saturday, the 13th March 1847

*7th March 1847.*—Did no work to-day beyond receiving the returns of the army.

*8th March*—Rode with Lieutenant Lumsden to the Fort of Jumrood or Futtehguh, about 12 miles from Peshawur, two chowkeys of Uibob sepoy's are on the road. The Fort is in good repair, has a garrison of 200 matchlocks and 30 Artillery, 3 guns; the men complain of being nine months in arrears. There is one well and a *bowlie*, neither affording much water, a stream comes from the Khyber, but for two months has been stopped, said to be owing to the Afreedees' pay not being forthcoming for that period. The citadel is much shaken from the firing of the gun, the grain in store excepting *makaie* is of Avitabile's time, mouldy and worm-eaten, the powder-magazine is in a mud hut, there are three gates with three lines of defence inclusive of the citadel, which is a lofty tower in the centre; the second line of defence is an octagon with 8 bastions, the lower square with 12; the whole is capable of holding 2,000 men, it has accommodation now for 500

I released this evening 14 prisoners who had been in confinement from two to six months. Had a conversation with the young Sudai, who opened it by saying he hoped I would take him by the hand as my brother had the Maharajah, to which I replied I was most willing and ready

*9th March*—The Lahore Akhbar mentions that orders had been sent on Dewan Moolraj of Pind Dadun Khan for 1,25,000 rupees, and on Peshawur for 20,000 rupees in payment of two months' arrears to the troops of General Golab Singh. Knowing that the order on this is not likely to be realised for some time and fearing lest the other be delayed, I would suggest that hoondees on the Soucars of Peshawur be sent in advance so as to have two months' pay always ready for the troops, this should be done even if by so doing the Lahore Troops are kept out of their pay. Rupees 1,55,000 are required for two months' pay of the Regulars under General Golab Singh.

I have confined eight sepoy's of the Ramgoles for leaving their regiment, on service in the Eusufzye country, to complain of their being

in arrears. I had hardly done this when 38 men of Colonel Ram Dass corps of Ramgoles presented themselves with a similar complaint. I have ordered them to be discharged when paid. What to do about these men I know not there are said to be 5,000 of them and all are from 8 to 11 months in arrears, and the treasury is empty with no prospect of its being filled. Sirdar Sultan Mahomed writes his brother Peer Mahomed Khan in grateful terms of my permitting him to return to his country and of his being heart and soul ours.

10th March 1847 — We rode to the Fort of Barrah which is on the bank of the river of the same name. This river furnishes the city and lands of Peshawur with water the stream near the Fort is portioned off to the city and zemindars in different streams under the orders of a *Meer Aube*, who farms it at 1 000 rupees a year the money going to the private purse of the Governor, its distribution as may be supposed, is the source of much oppression the rich paying the most get the lion's share and the lands of the zemindars are left unsupplied. In General Avitabile's time it was pretty equally apportioned for though he ground the poor he let no others do so his code, though oppressive in our eyes has ever since been so grievously carried out on the lower classes (*sic*) that they look back to it with sighs and hail any return to it with delight.

The Fort is a square of 85 paces with an outer defence and deep ditch, 20 feet in width. Three bastions in the inner part are solid and capable of holding guns, the fourth not so, the outer walls loopholed for musketry. The powder magazine is in a pukka arched roof mud above the small the garrison are said to be 100 matchlocks. I only saw 50 no guns only 2 zamboors and no zamboorchees. The Fort could hold 1 000 men. There is one well, but it is dry. A deep water cut runs along the north face within a few feet of the ditch the stores of grain are all mouldy and useless no attention is paid to them.

Intelligence from Gundamuck is that a kafilah was plundered close to the village by Azeez Khan Ghilzie. The state of the country from the Khyber to Cabul is represented as desperate.

11th March — Inspected the stores of the Fort of Shahmeer Ghur and ordered lists to be prepared, of grain there is little the magazines of regiments are pretty complete but save powder and lead there are no

spare stores The Fort is in good order, would hold 6 or 7,000 men ; it has only one nine-pounder and two one-pounders , the defences are three with gates to each, a good ditch and bastions, all capable of holding guns ; it commands the city , is built on the site of the ancient Bala Hissar , it is garrisoned by Ramgoles and is under the orders of the Governor. Sirdar Peer Mahomed, Barukzye, sent me his two guns, which I have parked with those of the Sikhs, returning his men and horses

The prisoners, Eusufzyes, in Attock are continually writing me to effect their release I think it would be politic

At my suggestion the young Sirdar has issued an *ishtahar* calling for tenders for the Government contracts for the ensuing year 19, which commenced to-day

*12th March 1847* —Commenced investigating the complaints of the Tuppa of Khalsa, the Kardarship of Dhurbara Singh

Informed that Kumurooddeen Khan has ill-treated some complainants against him, who took urzees from me for him to settle recommended the Sirdar to confine him

Had an auction of nuzzur horses and yaboos, which sold for 941 rupees. Generals Golab Singh, Mehtab Singh, and the other officers of the army with the Bukshee Jawahur Singh, and Chowdry attended.

Comparatively few complaints from the city are coming in I hear the Kutwal's daily reports Tried three cases of murder and cutting down and sent them to Lahore for orders Released three Eusufzyes, servants of Afzal Khan, son of Ameer Khan of Sidoom, who have been with their master in confinement ten months, their master remains pending orders from Lahore

*13th March* —Intelligence from Cabul and Jellalabad is that the Ghilzies all continue at issue ; that Nawab Jubbur Khan intends paying a visit to his brothers, Sirdars Sultan Mahomed, Peer Mahomed Khan and Syud Mahomed, Barukzyes, and taking that opportunity to ascertain the object of my being here

General Golab Singh has issued a general order to the troops, pointing out their duty on guards, warning them against leaving them, etc His son, Colonel Alla Singh, was present yesterday when I was



trying a case of a sepoy cutting down a prisoner under a sentry's charge. He asked me our rules and has evidently adopted them. He is a very intelligent officer, apparently most desirous of improving himself and the troops by intercourse with us. The General has put a stop to the officers and men cultivating the parade. He is constantly with us.

The crops are suffering from want of rain.

Geo St P LAWRENCE MAJOR  
Principal Asst to the Agent G G, N W F

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No 8.—Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor General, North West Frontier at Peshawur from Sunday the 14th, to Saturday, the 20th March 1847

*14th March 1847*—A general parade of troops under Golab Singh marched past in review and formed line from columns. The General tells me that they are much pleased with the new arrangements. I have directed that any grievance they may have should be instantly made known to me. A Sergeant of Colonel Maun Singh's Poorbeas complained that all the grades in his corps were sold. The Colonel receiving all the money, that as he would not pay, his position was made unsupportable. General Golab Singh is to inquire into it and report.

The soldiers complain that the Banneahs of the city will not take the rupees served out to them as pay from their not being of the year 1984. Orders have been issued that all rupees issued from the treasury to be taken.

Rode through the city in the evening.

*15th March*—Intelligence from Jellalabad is that Ameer Dost Mahomed Khan has sent his troops under his sons Mahomed Afzul and Hyder Khan, against Azeez Khan, Ghulzie, himself remaining on the banks of the river near Jellalabad.

The Paymaster of the troops arrived to-day with two months pay. I desired the General to explain to him that he must be cautious what rupees he issued as I would not suffer short weight ones or any on which *butta* could be demanded to be given. That my chief duty was to see the troops regularly paid. He replied that he could only

answer for the money he received in bills, but such as came from Lahore in specie he was obliged to take; that he would write to the Paymaster-General, if I would do the same by the Resident

I have been engaged for some days in taking the Revenue accounts, have had up the contractors of 100 villages yielding Rs. 2,50,000 who are defaulters to the amount of Rs. 30,000. They all plead inability to realise assets from various causes; that many only took the contracts being forced on them by Suddai Sher Singh; among them are large Jaghirdars and Urbobs receiving many thousands a year for former services. I have already reported that there is no money in the Peshawur Treasury; that the Ramgoles are in arrears from 9 to 11 months. I can procure one or two lakhs of rupees for bills on Ferozepoor or Lahore, and if sanctioned would pay up and discharge 1,500 or 2,000 of these men and so save the State from 15 to 20,000 rupees monthly

*16th March 1847*—By this day's Akhbar from Lahore I see the troops are being paid for the months of December and January, while those here are only getting for the two previous months. I note this that the Resident may arrange with the Durbai that the Peshawur Troops should never be in arrears more than two months

The Afreedees have sent a message that till they get Rs. 1,000 a month they will not let any water into the Fort of Futtehgurh, they have commenced plundering in a small way in the villages near the Khyber. I have directed the Urbobs who are in Government pay to take measures to put a stop to it.

*17th March*—I am preparing lists of the stores in the different forts; excepting in Shahmeer Ghur there are no munitions of war in any, and in it there is little beyond lead, powder and shot. General Golab Singh is preparing lists of those with the troops of Horse Artillery, which, I regret to say, are in a very inefficient state; they have little beyond men and guns. Horses and harness are especially needed; the men are a rough and ready soldierlike looking set

I attended the issue of pay this morning to the Khas Regiment and General Elahee Buksh's Artillery, which appeared to please the men much

The Paymasters promptly attended to my wishes in regard to some doubtful points which I gave in favor of the soldiers.

Intelligence is confirmed of the Cabul Troops under Dost Mahomed's sons having proceeded against Mahomed Shah Khan and Azeez Khan, Ghilzies. These two are at enmity amongst themselves, but opposed to the Ameer they act independently. With Mohamed Shah's Khoda Bulsh Khan and his brother Azad Khan of Tezeen.

Attended the issue of pay to General Mehtab Singh's Regiment

19th March 1847—Four companies of Colonel Ruttun Singh's Regiment were paid in my presence they having recently joined from leave there were deductions to make which delayed the issue the men were aware of their nature and were satisfied. It, however took up so much time that I sent the left wing to their lines to attend to-morrow.

Lieutenant Lumsden accompanied me last evening to dine at the Governor's and see fireworks and a *naulch*, he had so often invited us that I did not like any longer to decline—civil and military authorities attended. We left at 8 P.M.

The Governor at my suggestion and the General's has recalled the troops from the Eusufzye country, where they had been since September nominally collecting revenue, but really realizing none.

20th March—Ameer Dost Mahomed Khan's letter in reply to mine is merely complimentary. The *Cossul* (messenger) who brought it says that the Ameer left Jellalahad on the 18th for the Ghilzie campaign his letter is written by Abdool Sumee Khan of whom so much mention is made by Dr Wolff in his late journey to Bokhara.

GEO ST P LAWRENCE MAJOR  
Principal Asst to the Agent G G, N-W F

No 9—Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor General, North West Frontier at Peshawur, from Sunday, the 21st, to Saturday, the 27th March 1847

21st March 1847—It is reported in a letter from Hussan Abdall that the Gundghurries have burnt down the cantonment of Sirdar Bhoor Singh, which was not difficult to do as it was hedged in by dry thorns.

2nd March—Two companies of Muzbys in Colonel Ram Dass' Regiment of Ramgoles were ordered by the Governor to march and

occupy the Fort of Futtehguh. They pleaded inability to move, without pay, then, that without my order they would not, they sent in an urzee (petition) saying that they wanted to be removed from under Ram Dass' command, that he employed them continually in his private affairs, and that they had previously belonged to another corps. I had them all up, and in their presence pointed out to their officers the impropriety of their conduct, and ordered them to march this morning, one company to Futtehguh and one to the Fort of Barrah.

A case of cow-killing has been proved against a zemindar of a village not ten miles off; the authorities declare that they have not the power to seize the culprit without I give them the aid of the troops. I mention this to show the state of the country and the weakness of its rulers.

*23rd March 1847.*—Last night a lad of 14 was apprehended in the act of murdering another younger lad for the sake of his silver ornaments, the culprit is a Hindustani, a confirmed gambler.

Colonel Kahn Singh's two troops of Horse Artillery, 12 guns, arrived yesterday. I met them coming in, and inspected them; the horses are in wretched condition and the equipment most unserviceable. I have ordered an inspection parade of the whole of this arm on the arrival of the guns still absent, when I will report accordingly.

Sirdar Sultan Mahomed has written his brother, Sirdar Peer Mahomed, to enquire my wishes as to his mode of entry into Peshawur, whether it shall be private or public; that if the latter, it will redound to our credit, etc., etc. I replied that, on consulting with the local authorities, he should hear, my own opinion is that he should be allowed to make a public entry, and treated in every way with distinction.

*24th March.*—The cow-killing zemindar has not yet been brought in; I have left it to the authorities with their civil troops, Urbobs and Ramgoles, to secure him, declining to employ the Regulars in such a petty affair.

The arrears of revenue are about Rs 80,000, and I see little chance of realizing it.

Intelligence from Jellalahad is that Mahomed Azeez Khan Ghilzie, has fled from his fort at———into the higher mountains Khan Zeman Khan of Gundghur sent a confidential person to me to say that he had restrained his people for five weeks in hopes of some arrangements from Lahore being made but not hearing of any, two petty chiefs with their followers, had fired the lines at Hussan Abdall for which he would punish them I replied, the only way of saving himself was to seize and send them to Lahore.

25th March<sup>1847</sup>—The Governor and authorities approve of Sirdar Sultan Mahomed's entry being public. General Golab Singh and Bukee Jowahur Mull will meet him at Chumkunnur he is to take up his abode in the city or Wuzer B. or a place he pleases, if the former, he is only to keep 40 or 50 soldiers with him, sending the rest to Kohat and Hushtouger I have written him accordingly

The young Governor to everything I ask or suggest replies "As you please," "You know best", he never speaks unless addressed, and then merely replies A kafila from Peshawur was recently plundered near Lallpoora by Sahdut Khan, Momund, the road to Cabul continues infested by banditti

26th March.—The Governor to-day in conversation expressed himself greatly pleased with my mode of proceeding and said that since my arrival he had not felt the cares of government, that he was now under no apprehension from the disorderly troops (Ram goles) that the prompt punishment I had inflicted had spread wholesome dread among them his counsellors were open mouthed in their laudations

General Golab Singh with Colonel John Holmes, Soohhan Khan, ex Colonel, now Commandant, Bhogah Gurrillia, ex-Commandant now Adjutant, and Suhha ex Adjutant, now Subedar, waited on me, the three latter to represent their reduction in rank and pay they are the only officers of the 4th Regiment which went to Cabul with General Golab Singh who have been thus reduced, and they naturally consider it a grievance besides the loss of rank, their pay is severally reduced, the Colonels from eight per diem to five, Commandants from four to two, and Adjutants nine-eight to one

Colonel Holmes, who commands two regiments, used to receive Rs. 500 per mensem, now gets Rs 420, still holding the Brigade; by Rajah Lal Singh he was promised on marching for Peshawur Rs. 500 besides provision for his two elder sons! He observed that Colonel Cortlandt, who entered the service years after him, receives Rs. 600 per mensem.

*27th March 1847.*—We have had some genial showers, which were greatly wanted.

A sepoy of Soobhan Khan's Regiment brought me his pay. Rupees three were light; I had them immediately changed

All the troops, except those in Eusufzye country, who are expected in to-morrow, have received their pay, and I am happy to say I have only had three complaints; they observe that never was their pay so promptly issued, or with so little annoyance or squabbling.

The chief Paymaster, Neil Chund, Bhuggut Ram's brother, appears most anxious to please me.

The lad who cut down another has been sentenced to a year's imprisonment with hard labor on the roads.

GEO. ST P LAWRENCE, MAJOR,  
*Principal Asst. to the Agent, G.-G., N.-W. F.*

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**No. 10 —Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 28th March, to Saturday, the 3rd April 1847.**

*28th March 1847* —Lieutenant Lumsden rode to the Doaba Fort. Not being well I did not accompany him. He states that the Fort is situated about 15 miles north-west of Peshawur, on the left bank of the Cabul (or Nagoman) river and five miles from the stream. It is a place of no strength against Artillery; its position in the open and low country, which can be inundated at pleasure, would have been good had it not been commanded by a mound which runs along the south-west face at the distance of a hundred yards. The plan of the fort is an octagon, with small loopholed bastions at the angles, and a circular battery mounting one six-pounder in the centre; it has but one gate and

a wicket it would accommodate 400 men; the present garrison 120 including Artillery, and zamboorchees for 8 zamboors, of which number 94 were only present, half the men occupy the fort while the rest are distributed in small parties through the village which is built close under the walls on the south-east face, a mud wall surrounds the village, having a gate at the west end of the principal bazar, which appears to be in a thriving state. The magazine stores are in a mud hut on the eastern side of the fort, but there is no cover for the grain, which is all exposed in mat baskets placed on a chabootra round the battery; the grain is, however in a better state than any we have seen. There is a good well in the fort. The communication with Peshawur is along a tolerable road intersected at five points by branches of the Cabul river, four of which are fordable the fifth or main stream is sometimes so, but generally crossed by a ferry at Nahakee where there are four good boats. The Fort of Doaba is well calculated to keep in check the predatory Momund tribes and affording protection to the small villages in the open country along the foot of the hills, from which it is about three or four miles distant.

*29th March 1847—Nil*

*30th March*—Inspected the Horse Artillery, 30 guns the equipment of all most unserviceable, not more than ten carriages, limbers and carts serviceable, 250 horses and 40 men wanting to complete five troops; 8 of the guns require recasting. I have told General Golab Singh to have two troops completed and made fit for service. Wood is not to be had here for carriages it can only be got in the Eusufzye district and then not without a large price. I am told there are many Artillery horses at Lahore, which might be sent here with the harness complete. The Artillery General, Elahee Buksh, seems to have looked little after this fine arm he has hitherto lived in the city, but at my suggestion has moved into cantonments. All the ammunition is carried in huckeries which in any country, much less this, can never keep up. I would recommend the substitution of mules or camels.

*31st March*—Two villages have had a fight about water three men wounded. I am investigating it.

Sent three sets of Guides to ascertain the number of Kumurooddeen Khan's men on the road hence to Attock they report them to be not more than 25, he is paid for 500 l.

It is rumoured that an officer proceeding from Bunnoo Tank towards this has been obliged to return. This I cannot credit, though Lieutenant Edwardes did think of trying that route. Saw three regiments of Infantry exercise on their own parades, they work very slowly two in the French, one English mode. General Golab Singh was also looking on; he has ordered all to be out twice a week to exercise in front of their own lines.

*1st April 1847.*—Hearing some firing in the direction of the Khyber at 4 P.M., Lieutenant Lumsden with some Sikh Sowars and his Guide Cavalry rode in that direction, though it was raining hard it turned out to be a marriage procession. The Attock prisoners arrived this morning are lodged in the Fort of Shahmeer Ghur. I saw them this evening. They are all Eusufzyes and I think have been hardly dealt with. Bharam Khan, the son of Ursulla Khan, came in to make his submission to Sirdar Shere Singh; was seized and imprisoned, though the Sikhs admit that he and his father had done good service. I hope to make a settlement for the revenue of their country through them.

*2nd April.*—The Sirdar sent to tell me that it was reported in the city cows were being killed and asked what he should do? I replied at once to have the parties seized. The arrival of Sirdar Sultan Mahomed is causing a great sensation and rather alarms the Sikh authorities. They want me to sanction their hanging the cow-killers, but this I have told them I cannot do. They declare unless it is done, their authority will altogether cease.

*3rd April*—Engaged in investigating the cow-killing cases. There is no doubt many have been slain; have confined five men as concerned in it. Have received Rs 17,250 from shroffs of the city for Bills on Loodianah at par, Nanukshahee rupees for Sonats, and am promised Rs 7,150 more at the same rate; but if I want more I shall have to pay a premium of from eight annas to one rupee per cent. I have received a note from Lieutenant Edwardes of the 25th instant from Bunnoo Tank. I have little hope of for some time obtaining any correct information from Bokhara or Khiva.

GEO. ST P LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G.-G., N.-W F*



No. 11 — Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor-General, North West Frontier at Peshawur, from Sunday, the 4th, to Saturday, the 10th April 1847

*4th April 1847*—This morning Sirdar Sultan Mahomed Barukzye, returned to Peshawur with his family after a lapse of seven years. I met him by appointment at the Governor's, he was received with every possible attention. General Golab Singh and Bukshee Jawahur Mull meeting him at Chumkunnee, six miles off, and saluted on dismounting from his elephant by 15 guns. he proceeded through the city with about 150 horsemen to his own house. I rode through the city shortly after and found it perfectly quiet, though many people were assembled to see the Sirdar's entry.

*5th April*—I rode this morning to the village of Hazarnow and directed the houses of the men who had slaughtered cows to be levelled and their property confiscated, the most of them have fled, but five who are prisoners have been sentenced to receive three dozen lashes, one dozen a day for three days, and to be imprisoned six months with hard labour on the roads. this, I trust, will have a salutary effect in putting a stop to this, in the eyes of the Sikhs serious crime. It is gratifying to know that during all the excitement caused by this the troops have remained perfectly passive. a short time ago they would have plundered and destroyed the village merely on the report of such an occurrence.

*6th April*.—Intelligence from Jellalabad is that Ameer Dost Mahomed has arranged the differences with Mahomed Shah Khan, Azeez Khan and Khoda Buksh Khan Ghilzies; and that it is expected the road of Cabul will soon be open. he has several Khyber Chiefs with him. The late rains have brought crops well forward.

*7th April*—The Governor has released the Attock prisoners, Bahram Khan, son of Ursulla Khan, Meer Khan of Sidoom and his two sons and Meer Afzul Khan, Hotee and sent them to me. they express themselves our slaves for ever; that had it not been for us they would have lingered till death released them. that for the eleven months of their imprisonment, till I saw them, not a soul had ever enquired after them. that they are men risen from the grave.

*8th April 1847.*—Had an auction of nuzzur horses and saddles last evening, it was attended by all the Officers Commanding Regiments with Generals Golab Singh and Mehtab Singh. The Vakeel of Ameer Dost Mahomed from Lahore started by the Tartaira road to Jellalabad thus evincing his fear of trusting himself by the Khyber road though promised escort by some of the Khyber Chiefs

*9th April*—Intelligence has been received of the death at Makoon of Sirdar Rahim Dill Khan, half-brother of Dost Mahamed Khan, on his return from Cabul towards Kandahar, the date is not mentioned I have been engaged for some days in taking the muster of the Ramgoles, with a view to their Pay Bills being prepared by the Paymasters of the Regular forces I propose discharging all enlisted in Sirdar Shere Singh's Governorship and reducing his Native officers, many of whom were promoted on the day of enlistment, doubtless for money received

*10th April*—The Governor received last evening orders from the Durbar relative to the reduction of the Ramgoles, they are much to the effect of those I had proposed to him and will be a saving to the State of a lakh and eighty thousand rupees at least per annum The Governor continues to find great difficulty in getting contractors to take the farm of many villages I suggested that they should be offered to respectable zemindars, but the authorities declare the revenue would never be realized through them; they want to force the present contractors to continue their engagements, which of course I will not permit Sirdar Chuttur Singh, Attariwalla, the young Governor's father, writes me that he cannot yet mount a horse and therefore is unable to join the Government. I replied that it was unnecessary he should do so as I had hopes all would go on well under his son, for my own part I consider the lad less objectionable than the ancient, for the latter would leave all the work in the present hands, and I should have the weight of his years and name to contend with in addition to what is now arrayed against me

GEO ST P LAWRENCE, MAJOR,  
Principal Asst to the Agent, G-G, N.-W. F.

No 12.—Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor General, North West Frontier, at Peshawur from Sunday the 11th, to Saturday the 17th April 1847

11th April 1847 —Two sepoys of the Muzby Company stationed at Futtehgurh were attacked last evening within a mile of cantonments they say by a dozen men. One was shot through the fleshy part of the stomach, the other cut by a sabre through the nose. They came to me and I had their wounds dressed by Mr Apothecary Thompson, both are doing well. I rode this morning to the village of Chittutny, from where the party are said to have come, and directed the Urbob, Zeereem Khan, to apprehend them. I suspect they belong to some Barowzye Horse who were employed to protect the road hence to Futtehgurh but were discharged by order of the Durbar a few days since.

This being the festival of *Bysakhee Sungrand* the Governor sent me a *teaful* of some sheep fowls, rice and atta. A large fair is held by the Hindus at the river beach near the Fort, to which I have sent the Chief Kotwal with a party of police and a company of Ramgoles, to preserve the peace.

12th April —Talking to Colonel Alla Singh General Golab Singh's son of the assault on the two sepoys he declared that I was too soft and easy going with the people that they did not understand any thing but hard knocks. I replied that with us that was the last alternative we tried soft measures first, but could be severe when necessary. I hear this on every side. Avtabelle's reign of terror is by the Sikhs greatly lauded with regard to this, I am happy to observe that of all his gibbets only one now remains.

Sirdar Sultan Mahomed as usual, expressed great devotion to us and vaunted of his ability to perform any service we might require from this to Herat. I replied I doubted it not, but that beyond Peshawur he must be aware we required no service there is a rumour abroad that he expects us to favor his ejecting his brother, the Ameer, from the throne of Cabul it is not unlikely that this has originated with himself or followers.

The fair of Barrah went off most peaceably.

13th April —The muster of the Ramgoles continues daily. As characteristic of the state of these troops, I may observe that a detail

of 16 Horse and as many Foot under the denomination of Carabineers appeared this morning when the Chowdry, one of the Governor's ministers, naively remarked —“ Where have these men come from ; I have not seen them for nine months ? ” They are styled the Governor's Orderlies ! A lad of fifteen appeared as Governor of the Fort of Bariah I have suggested that an experienced officer be sent to replace him

General Golab Singh reports that at the Sikh festival of *Sungrand*, hardly a drunken Sikh soldier was seen in the city, and not a complaint has been made—a most improved and pleasing change from the olden time when such a day never passed without sundry men being wounded or killed in their cups in this respect the real Khalsas are much like the British soldier, only with less command of themselves in liquor

*14th April 1847.*—The Governor's Councillors waited on me yesterday with several contractors and zemindars who were unwilling to renew their leases for this year hitherto it has been customary to coerce them into it, but I have discountenanced such practice, telling them when they failed by persuasion to bring the parties to me we succeeded towards evening by a small reduction of revenue in inducing them to renew their contracts

Two Hindustanee sepoy (evidently deserters from our Army) of Colonel Maun Singh's Regiment passed me last evening as I walked in my own grounds, turning their heads and staring me full in the face in a most insulting manner, without saluting I sent them to their Colonel to have them taught their duty he dismissed them without the slightest reproof I have consequently reported the whole to the General Commanding This Colonel is quite unfit for his position, is the one complained against as selling promotion, the investigation of which I did not enter into, as the General represented that it would involve officials at Lahore in high stations

*15th April*—The General reports that Colonel Dewa Singh, commanding the Khas Dragoons, complained of his beard having been pulled by Ressildar Soudagur Singh, that on investigating the case it appeared both had quarrelled and fought : he had therefore removed the Colonel to the Khas Infantry Regiment, transferring Colonel Kahn Singh, Rosa,

who had originally belonged to it from the former to the latter, and ordered the Ressildar to be dismissed the service. I expressed my entire approval. Colonel Dewa Singh has served 25 years in the Infantry and is altogether incompetent as a Cavalry Officer, while Colonel Kahn Singh is a very smart intelligent officer. I have seen both at exercise.

*16th April 1847*—Intelligence from Jellalabad is that the Ameer has destroyed the Fort of Buddeabad in Lughman and given all Mahomed Shah Khan Ghilzie's lands to his enemies, confining his son and brother, Dost Mahomed Khan. Mahomed Shah Khan is said to have fled towards Tagow, his lands have been made over to his enemies many of whom he had dispossessed of them.

The ex Governor of Guznee, Gholam Hyder Khan the late Akhar Khan's full brother is to remain as Governor of Jellalabad and the Eastern Ghilzies, on the departure for Cabul of the Ameer, which is expected to be in a few days. The other Ghilzie Chiefs Azeez Khan Khoda Buksh Khan etc., are reported to have made their submission.

*17th April*—Sirdar Peer Mahomed Khan wants leave to reduce the Adzyes a tribe in the hills, distant only ten *cos*s. he represents that they never pay revenue till forced by the appearance of troops. I have written them to come in and talk to me telling them should they not to do so the Sirdar will be authorised to take his own measures.

Last night a party of plunderers opened a fire on the Artillery sentries. General Golab Singh himself got up and ordered out two companies after them but they made themselves scarce their audacity is great.

GEO ST P LAWRENCE MAJOR,  
Principal Asst to the Agent, G-G, N W F

No 13—Political Diary of Major George St. P. Lawrence  
Principal Assistant to the Agent to the Governor  
General, North West Frontier at Peshawur, from  
Sunday, the 18th, to Saturday the 24th April 1847

*18th April 1847*—Sirdar Peer Mahomed Khan brought Durraah Khan, Adzye to pay his respects. This is the man who recently made

his escape from Umritser, where he had been confined about a year, his Fort was taken and destroyed by Suddai Tej Singh in 1844-45, himself made prisoner and kept in custody in the Fort of Shameer Ghur till removed to Govind Ghur, his crime is said to have been robbing and plundering on the highway, he has only given himself up on the assurance of personal safety and forgiveness of the past, under promise of future amendment and service, guaranteed by the Baiukzye Suddars

He is short, stout, and active, but apparently not *over* intelligent; the Sikhs, however, hold him in great terror, he never having rendered allegiance, though he sent in his son in Avitabile's time

19th April 1847—I commenced this morning the payment of the discharged Ramgoles, for the most part they are 12 months in arrears; they appeared agreeably surprised at receiving their full amount of pay and left perfectly delighted.

A sepoy of General Mehtab Singh's Regiment was found murdered this morning, not 100 yards from his lines he was last seen at midnight; was an opium-eater and is supposed to have wandered to where his corpse was found under its influence

20th April—The Eusufzye Chiefs are all coming in to pay their respects Mahomed Khan of Hotee declined going near the Governor till I told him he must, they all appear to be very bitter against the Sikhs, whose system appears to have been to keep them all at enmity with each other and then plunder them indiscriminately

A treasure party with Rs 1,25,000 arrived from Lahore yesterday, towards the payment of the troops

21st April—Yesterday Suddai Outar Singh, the Governor, sent to say he wished to call to discuss matters of moment I replied that I should wait on him in the evening, which I did accompanied by Lieutenant Lumsden After compliments and the expression of his thankfulness for the kind and considerate manner in which from my arrival I had ever treated him, and the great benefit he had derived from my presence, he begged that I would consider him at all times most anxious to carry out my wishes, that I would ask General Golab Singh to aid him with his counsel and experience, that I would overlook such matters as receipts in excess of revenue that had according to Sikh usage been taken ere I arrived, and in future all such should cease, and more to the same effect.

The General visits him this evening he naively observed that the only advice he could give the Governor and his ministers was to leave off their old practices and to do nothing without consulting the Sahib. If they would only thus do, all would go right.

Ameer Khan the head of the Barowzye Horse lately discharged who had sent his family and cattle to the hills and is suspected of setting on his men to plunder fire into cantonments, etc., called at my desire. He refused to come in to the Sirdar and has agreed to get back his family and obey all orders from the Governor, etc.

22nd April 1847 — Dawur Khan a Mullik of Mashoo Khail, accused of being concerned in sundry outrages etc. and a defaulter in revenue having refused to come in on the Governor's summons I determined to seize him, so sent Lieutenant Lumsden with 200 Horse and 200 Infantry to surprise him. The party arrived at gun fire at his village, which they surrounded. Lieutenant Lumsden proceeding with the Infantry to his house. As they entered the clatter of hoofs was heard and Dawur with two followers galloped out of the village, but coming on the Cavalry they threw themselves off their horses disencumbered themselves of their arms, which were found and fled under cover of the fields of standing wheat to the village, where Dawur Khan, disguised as a woman succeeded in concealing himself. Lieutenant Lumsden however, secured his son brother and nephew with seven Mulliks who aided him in his escape. Lieutenant Lumsden also disarmed 28 of his followers.

Though not successful to the full extent I am still well content with the result of our *chapa*, and I doubt not that it will be attended with beneficial results. The people will understand that their misdeeds will be promptly adjudged, that the Government is now powerful to protect as well as to punish. I am happy to add that Lieutenant Lumsden reports that the Sikh Troops behaved most subordinately. Though evidently anxious to punish the Mahomedans particularly after finding two Sikh shields with balls through them, not an outrage was committed or shot fired.

Intelligence of the recall of the Governor arrived last night. He leaves on the 24th. I have recommended his ministers to shade

their accounts forthwith and to furnish me with a statement of all sums they may have taken from the people in excess of the revenue and admitted rights of the Governor.

23<sup>rd</sup> April 1847.—I am congratulated on all sides on the successful *chapan* of yesterday. It is observed that even General Avitabile never dared trust himself in the village of Mashoo Khail, being satisfied with sending the troops to turn and destroy all before them, and that Sirdar Tej Singh would not have ventured on such an expedition with less than some thousand men: the secrecy and celerity of the movement gave the villagers no time to resist, and the disarming each man as he came out of his house was a most happy move.

24<sup>th</sup> April—On taking leave last evening I presented the young Governor with a khillut of nine *parchas*; he expressed much gratitude for all the kindness and consideration I have shown him.

The Bukshee gave in his account to the amount of Rs. 42,701 of sums received in excess of revenue as perquisites of the Governor.

We had a heavy storm of rain, thunder and lightning all night. I rode out at gun-fire to escort the ex-Governor some distance, at which he was evidently much pleased. Lieutenant Lumsden accompanied us, we parted with mutual expression of good-will, compliments, etc.

The General has given him an escort of a Resallah and Company of Ramgoles to Bootah, his paternal domain.

We were well ducked in returning; the whole face of the country is covered with water. No recent intelligence from the west.

GEO ST P. LAWRENCE, MAJOR,  
Principal Asst to the Agent, G-G, N-W F

**No 14.—Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 25th April, to Saturday, the 1st May 1847**

25<sup>th</sup> April 1847—Intelligence from Cabul is that the Ameer was expected on the 12th instant; the people there are still in a great state of excitement as to my being here, and will not credit that we have



no design in their quarter a friend writing to my Moonshee upbraids for not yet having told him what our real object is', another writes him 'Do let me know when the Sahiban are coming'

General Melitab Singh, with the skeleton of his regiment (those volunteering for Colonel Kahn Singh a corps remaining) will march on the 4th for Pind Dadun Khan The General has heard from Lahore that it is the intention of Government to shelve him Since my arrival I must say he has obeyed all orders and seemingly with alacrity he is smart and intelligent but I should think intriguing his regiment is very steady on parade and a fine body of men

It has rained all day and night.

The Adzyce Mulliks complain that Sirdar Peer-Mahomed wants them to pay fines and penalties in addition to revenue I have advised that he should excuse them, contenting himself with realizing the legitimate revenue. I have recommended them to come to terms with him if they cared to preserve themselves and families as if they proceed against them they would all be destroyed or ruined

26th April 1847—The heavy rain has brought down fifteen houses in the city and portions of the outer wall it has cleared up, and I purpose this evening proceeding to inspect the damage done

About 650 of the Ramgoles have been discharged of these 450 present have been paid up at an outlay of 34 000 rupees It is terrible to see how the public money has been squandered boys of 8, 10 and 12 years receiving from 50 to 100 rupees monthly Moonshees who would have been well pleased with 15 to 25 drawing more than double and treble almost all are from 10 to 12 months in arrears

A report having arrived from Lahore that attempts had been made to stir up the troops here in the cow killing matter, General Golab Singh brought me a disclaimer signed by all the Generals and Colonels my own belief is that no such attempt was made

27th April—Rode last evening and this morning round and through the city The damage done has been chiefly caused by neglecting the drainage since Avtabile left no attention has been paid to it the sewers and even arches of the bridges are choked up I have set men to clean them out.

Several of the Eusufzyes visited me to-day with Urbob Mudjeid Khan, he congratulates himself on our arrival and says that in the matter of feeding scpoys sent to collect revenue which I have put a stop to, he alone saves 500 rupees a year; that our proceedings in regard to the Mushoo Khail malcontents have delighted all the people, who are loud in our praise for the orderly conduct of the troops employed

28th April 1847.—The volunteering of General Mehtab Singh's Regiment into Colonel Kahn Singh's took place in my presence this morning each company was asked in a body; about 129 men turned out, more it is said will follow ere the corps marches it is a very fine-looking regiment.

Intelligence from Cabul to the 22nd instant is that the Ameer arrived on the 19th and was meditating sending Nawab Jubbar Khan to Khoolum to assist the Meer Wallee, who was hard pressed by Zoolfakar Khan and Shoojahooddeen Khan, Chiefs of Surbund and Mazar, the former had surprised a party of 300 of the Wallee's Horse and taken them prisoners, releasing the men but keeping their arms and horses, the road to Meshed and Bokhara was closed consequent on the plunder of 150 camel-loads of merchandise (Russian) proceeding from Persia towards Khiva, and that differences had arisen between Meshed and Persia. A *cossid* from Yar Mahomed of Herat to Ameer Dost Mahomed Khan is said to have been the bearer of this news

29th April.—Thirty-nine sowars of Sndar Suijun Singh, Rungur Nungalea, arrived last evening from Lahore, the advance of 500 long since expected, out of them I rejected five horses as unfit for service

Received a complimentary message from the Deputy Governor of Jellalabad, Meer Akhore Ahmed, who was our civil custodian at Bamian, where the prisoners negotiated their escape. He was always most kind and attentive to me, and bears a high character for truth and probity, a singular exception to most of his countrymen, he would not hear of betraying his trust by aiding in our liberation

Slight showers with sunshine. I fear the volunteering of Mehtab Singh's Regiment will be a failure, no more men having come forward;

they have not been accustomed to have an option, only understand an order; their officers evidently keep them back, otherwise as the men know they are pretty certain to be discharged it would be natural they should prefer remaining in the service indeed, I think I could see it in their looks when they march on the 4th I hope more will stay

30th April 1847—Rather a sensation amongst the officers has been caused by my pointing out a para. in the *Dehli Gazette* of the 21st instant in which it is said that General Mehtab Singh deemed it his duty to report to the Durbar that in the time of the great Maharajah cows were never killed at Peshawur but of late in several villages many had been slain This coming after signing the disclaimer placed him in an unbappy fix, he, however, positively denies ever having written a word on the subject and challenges the production, before the Resident of the letter

It was reported that in a village distant 12 *koss* an affray was on and that two or three men had been killed I have sent for the leaders.

The Eusufzye Khans have taken leave and started to be ready to meet Lieutenant Lumsden who I purpose deputing to make a hasty tour through the country to enable me to make some settlement of it. From all I can hear it has been shamefully treated, the people ground to the dust; much is expected from us, and I trust we shall not disappoint them.

1st May—The payment of the troops commenced yesterday they are getting four months, *vis* from the 3rd December to the 11th April, *Poh, Magh, Phagun Chait*—the last two include the much prized batta Mehtab Singh's Regiment and a company proceeding on escort with Lieutenant Lumsden were paid in my presence and this morning the right wing of Meer Jung Ali's corps (Mabomedans)

The road from Jellalabad to Cabul is now open to large Kafilas the Khyber is still closed

GEO ST P LAWRENCE, MAJOR,  
Principal Asst to the Agent G-G, N-IV F

**No. 15 —Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 2nd, to Saturday, the 8th May 1847.**

*2nd May 1847*—The leaders of the affray, which in my Diary of the 30th I report having sent for, returned for answer that they had never presented themselves at Peshawur, and never would; that if I tried to seize them they would fly to the hills, their village is close under them. I started a party of Afghans under my Moonshee, Hadjie Mahomed, who seeing my anxiety to get them volunteered his services, and I am happy to say succeeded in capturing and bringing in the five survivors, most atrocious looking cut-throats. He reached the village as day dawned, and found all prepared for flight, the bullock-loads lying around their houses. The five men occupied the same house, and at first meditated resistance, but, on the Moonshee assuring them that a large force was in the rear, they gave themselves up; their arms were brought in. He represents the village as a wretched collection of 40 mud huts, but very difficult of access. I have presented him with a watch, and the party with Rs 25

In the evening Dawur Khan of Mashoo Khail gave himself up on my assurance of a fair trial. As he was coming in and close at hand, one of the opposite party fired at him; he escaped, but the ball grazed the nose of one of his followers. I have confined the man who after firing came to me as if he had done a praiseworthy act. I mention the circumstance as indicative of the state of the country.

*3rd May*—Lieutenant Lumsden marched this morning towards Eusufzye, accompanied by Colonel Alla Singh and several of the Khans; his escort 25 Sikh sowars, 2 companies of Infantry, and Detachment of his Cavalry and Infantry Guides. I accompanied him a short way and in returning inspected the cantonment of Sirdar Suchet Singh, which has suffered considerably from the late rain, it consists of ten ranges of barracks with native officers' houses in rear. Two ranges on the left flank I have directed to be pulled down to repair the rest, so as to be ready for Ram Sabare's Regiment, which I intend to locate

here instead of the lines of Mehtab Singh's corps, which are in a hollow, and built most irregularly

Moollah Nujeeb arrived from Lahore, and called to pay his respects and present his sunnud for the restoration of his jaghur

*4th May 1847* —Rode this morning to the village of Lallah Kallab, distant six *koss*, accompanied by the Kardar Durbarra Singh to see the injury done to the crops by the late inundation of the Barrab from the rain, it must have risen at least from 8 to 10 feet and has done considerable damage destroying 50 or 60 houses in this village, 14 or 1,600 maunds of grain and much of the standing crop the village is on the road to Pubbee from which it is distant five *koss* and the Barrab here runs in a rapid stream with an immense body of water

General Mehtab Singh took leave with many professions of devotion to us, he marched with his corps at 11 A.M.

Sirdars Sultan and Peer Mahomed said they had received letters from their brother Sirdar Rahim Dill Khan of Candahar professing himself our servant and well wisher and enquiring if there was any objection to his coming to Peshawur to see his brothers I replied I saw none that he might come when he liked as might the Amecr Dost Mahomed Khan if he wished, that I would report accordingly to Lahore

Three Akalees got drunk one cut down a Ramgole severely wounding him in the calf On sending to seize them they at first resisted, but were secured and brought to me. I confined two for some days and the third for three months in irons first advising with the Generals one of them had his hand shattered by a gun shot, when fighting against General Avitabile from him I took an engagement that he would in future conduct himself with sobriety and order, under pain of expulsion from this district.

*5th May* —Shahzadah Mahomed Tyfoor wants me to get his house restored which was confiscated 16 years ago

Mr Agnew writes me from Hussan Abdall that he marched for Chuch this day, and Dewan Hakim Raie that he comes in to-morrow but will encamp at the Shable Bagh till the 16th which is an auspicious day for his entering the city I replied that he might please himself A slight shock of earthquake at 3 P.M., weather close and cloudy

With a view to carry out the Governor-General's views I have told General Golab Singh to announce that any soldiers wishing to remit money to their families may lodge the same in this Treasury, and will receive either from me or the Resident bills for the amount. I have likewise announced that the Durbar will be solicited to annul the present rule which confiscates to the State all the arrears of pay of deceased men, and to substitute the more just and liberal one of awarding it to their families or relatives. The officers say these ameliorations will give universal satisfaction.

I rode through the lines of the 1st Ramgole Regiment last evening to the Colonel's house, who was out, most of the men came out and surrounded me, saluting me in the most respectful manner. I stopped some time talking to them, the late Governor would not have dared to trust himself among them.

A party of a Daffadar and 6 Sowars of the 16th or Liptrott's Irregulars have arrived from Nacodia (*sic*) on seven months' leave, they say they were formerly in Feris' Jezailchees.

7th May 1847.—Hakim Raie, the new Adaluttee, Naib Nazim and Kardar, arrived yesterday, and brought purwannahs from the Durbar to the General, Urbobs, and Ramgoles, and from which it would all but appear that he was the Governor instead of the Naib, he seems smart and intelligent, and professes he is only here to attend to our wishes and orders, and that he looks up to us as he did to the Maharaja.

Bukshee Singh's troop of Horse Artillery from Lahore and Goojrat arrived, also the Golandauze of Colonel Alla Singh under the Adjutant; the Commander Soondhui Singh is said to have taken leave and gone to his home.

The purwannah appointing General Golab Singh Governor arrived this evening much to my joy, as now I expect to be relieved of the onus of the government; the officers of the army assembled in my house and warmly congratulated the new Governor. I took the opportunity to point out that such was the reward of a long course of good service, and to express my hopes that each of them might attain like distinction.

8th May.—The issue of pay to the Regular Army will be concluded on the 12th, they will then be only one month in arrears, it has

been paid in my presence, that is, I in one room and the Paymaster in the next with the door open between us as yet there has not been one complaint. Sirdar Sultan Mahomed has presented me with a horse, and made me promise not to sell him his value will be carried to Government account.

A sepoy of Ramgoles poisoned himself, he was brought to me in a senseless state. Mr Thompson applied the stomach pump but without avail

GEO ST P LAWRENCE, MAJOR  
Principal Asst to the Agent, G G, N-<sup>o</sup> 7 F

No 16.—Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor General, North West Frontier at Peshawur from Sunday, the 16th, to Saturday, the 22nd May 1847

16th May 1847—I have commenced making a round of visits to the Colonels of Corps, which please them much. I send notice the previous day, and they have their officers to meet me. Nothing can exceed the attention they pay me, when they lose their reserve they converse freely, and have given me some amusing anecdotes of the late campaign. They all extol the valor of our European Troops, but not so that of our Native. They attribute their own defeat to their want of leaders and their own disorganized state.

17th May—Called on Colonels Ruttun Singh, Man and Mehtan Singh Moraria, who presented me with horses and money; the former I declined, telling them that the practice of giving presents prevented men from paying as many visits as inclination would otherwise induce. At they promise to make no more, but such was their custom, and they would suffer in public estimation did they not make offerings on my first visit this was an appeal there was no resisting

Lieutenant Lumsden writes me that the state of the Eusufzye country is beyond belief, that he is besieged by thousands of complainants and that such is the fearful state of misrule engendered by Sirdar Sber Singh's system of grinding exactions that it is impossible to say what has really been paid to Government, taken by the Sirdar plundered by the troops, or made away with by the khans,

that there is not a single house in the whole district that has not been literally gutted, etc., etc.; that the Khans keep large bands of horse, fed and equipped by the plunder of the people

*18th May 1847.*—Intelligence from Cabul of the 10th is that the Asufoodoula has marched from Meshed, and that the Shah of Persia, with an army of 60,000 and 150 guns, has made two marches from Tehran towards Meshed, on hearing which, it is said that Asufoodoula started with 25 horsemen towards the Persian camp: some people say the army is destined for Herat, others Khiva. It is said there is a Sahib at Kokand, and that he gave a draft for 1,000 *tillahs* on a shroff at Cabul, which was returned, the shroff not being forthcoming

The city of Cabul has suffered considerably from the recent rain; the Ameer has all letters from this quarter taken to him which he reads and gives back. The intelligence letter which was despatched on the 30th ultimo from Cabul to me has not reached

I dined at General Elahee Buksh's last night; he gave a grand entertainment to 3 or 400; all the officers were present, with General Sirdar Golab Singh. I received a tray of 9 *parichas* and 250 rupees, with a horse, this latter I returned

In a private letter from Jellalabad to one of my people it was mentioned that matters were not going on well at Cabul, and that the Governor had been sent for, also that the Ghilzie insurrection was but partially suppressed. Called on Colonel John Holmes, who presented me with 226 rupees and a horse. I returned the latter.

I have written Lieutenant Lumsden not to enter too minutely into all the cases of oppression brought before him, but only such as appear to require immediate attention; to tell the others they must bide their time, that all will get a fair hearing; and to try and make the Khans understand that the sooner they dismiss their bands of predatory horse the better, and that any complaints of present oppression will be visited heavily. I have also told him not to press too hard on the Khans, as they only followed the example set them, and that the zemindars must be led to hope more from the future than to expect redress for the past, etc

*20th May*—As indicative of the state of alarm in which the Ameer Dost Mahomed Khan is in as to our intention towards Cabul, I may



here observe that the messenger who took my last letter was placed under charge and not allowed to leave the house for the two days he remained or communicate with any one he was then escorted to Bootkak and told to make the best of his way here. The Resident's letter which I forwarded with one from myself, was to request that a Commissariat Gomaatah, said to be in confinement near Guznee, might be released and sent to me the Ameer with many professions promises compliance.

We had a dust storm last evening followed by thunder lightning and rain which lasted some hours.

A seizure has been made of 111 camels with smuggled salt in communication with the Governor I have ordered the salt to be lodged in the Government Stores, and the camels to be sold on the public account.

*21st May 1847* — General Elahce Buksh, Commanding the Artillery, called to present Commandant Soondhur Singh and Bellod Khan, on arrival from Lahore the Artillery horses ordered long since from the capital have not yet arrived.

Have heard from the Resident that he approves of my suggestion of substituting a national standard for the Khalsa troops and forts in lieu of the present Tri Color also that the English exercise and drill should be adopted when this is done, I can amuse myself with manœuvring the Cavalry Brigade and also look better after their Infantry evolutions in which latter Lieutenant Lumaden will assist.

*22nd May* — Dined at Colonel Meer Jung Ali's. He was for 15 years in our Infantry is smart, intelligent and soldierlike and has a good regiment. General Sirdar Golab Singh and the Colonel's Commandant were present. During General Pollock's campaign he went in command of 300 Sikh Infantry with Colonel Lawrence to Cabul.

My private information from the lines of corps is that the men are all well pleased with the present order of things and only afraid lest by any misconduct they should lose the service as long as matters go on well at Lahore, the troops here I think may be depended on. I have called on the General for a statement of the services of each officer, and expressed my intention of reviewing each regiment in the course of the next month.

The new Governor, General Golab Singh, calls on me daily, and will do nothing without consulting me, so that in fact I am the Governor, in all but the name

I am happy to report that everything is quiet in the Province, and that on all sides the perfect peace which prevails is attributed to the presence of British authorities.

The revenue settlements for the year are nearly completed.

GEO. ST. P. LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G-G., N-W. F*

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**No 17.—Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 23rd, to Saturday, the 29th May 1847.**

*23rd May 1847* —A general parade of the force, after which the Sirdar, General Golab Singh, called with most of his officers. I am happy to observe that his elevation to the Governorship has in no way diminished his zeal and *esprit de corps*, if I may so style it, as Commander of the forces, he receives the daily reports and attends to the minutest particulars. He and his Deputy Governor, Dewan Hakim Raie, came to me about 6 P.M. yesterday, and were with me till 8, reporting their proceedings in revenue and judicial matters for the last three days

Two dismounted troops of Artillery arrived from Lahore to complete the Peshawur establishment, they are a rough-and-ready, wild-looking set, apparently under little control. Several are absent without leave, a common custom in the Sikh army on being ordered to Peshawur or elsewhere they go to their homes for a month or two and then join at their pleasure, affording a fine opportunity for the Paymaster's retrenchments

*24th May* —Mahomed Hossein, vakeel of Ameer Dost Mahomed Khan, arrived from Cabul yesterday, and called this morning, bringing letters for the Resident and myself. He produced, by desire of his master, several letters bearing the seal of Syed Mahomed, Pugmaun, better known to us as Jan Fishan Khan, our pensioner residing at Surdhunna, in which,

with much abuse of the Ameer and present Government he recommends his friends to bide their time in six months the British would be at Cabul etc The Ameer of course disclaims all idea of these letters emanating from us but deems it as well we should know that such have been sent

The Governor and Deputy were with me for several hours discussing revenue and judicial matters; the former issued a proclamation against giving and taking bribes

25th May 1847 —Dined at Colonel Ameer Khan's last evening, he had a guard of honor drawn out, and his band received me with our national anthem almost all his officers and men are Hindoostanee Mussulmen The General and other officers were present, the corps is said to be a crack one, and never to have been engaged in any of the outbreaks of the Sikh army A remount of 80 horses for the Artillery arrived this morning from Lahore with harness complete one died *en route* all are in indifferent condition

Orders have been received for the march of the Khas Dragoons under Colonel Kahn Singh to Lahore on being relieved by the Churungeet corps the regiment would rather remain and be weeded here, but as the Colonel observed they have now only to obey

The Cabul vakeel has been questioning my Moonshee as to whether I remain here during the hot weather, and if I go is any other gentleman to come? The Moonshee has heard from one of the vakeels a people that the Ameer's special instructions were to ascertain if the Sahibs were to remain for good at Peshawur It is clear that our proximity disturbs him.

26th May —Saw the troops at Brigade exercise this morning four Infantry, one Cavalry and troop of Horse Artillery, the Commander of the troops was on the field, but only as a spectator Colonel Ruttun Singh Man, commanded and manœuvred much the same as the General, indeed he is a pupil of his

1st.—The Brigade threw back its right by echelon of companies on No 8 of the 2nd Regiment.

2nd.—Threw forward the 3rd retired by double column of companies from the centre.

3rd.—Line to the rear on leading companies

4th —Counter-march on centre by files and columns of companies and troops

5th —Column *en masse* by the march of files. General salute

The Cavalry were very wild and seemed to be little attended to I called on Colonel Maun Singh, Commanding the Poorbea or Hindoo-stance Regiment, and sat a couple of hours talking to himself and Soobadars, he is the son of the late General Dhokul Singh, an ex-havildar of ours, who raised this the first regular regiment for the Maharajah; the men are with few exceptions from our provinces and many formerly in our service. Lieutenant Lumsden recognised one who deserted from his own company the night before Sobraon. I at first thought of sending this man to the Resident, but on consideration deemed it would be imprudent and might be productive of bad consequences without any commensurate good.

27th May 1847 —Lieutenant Lumsden, with Colonel Alla Singh, returned from the Eusufzye country this morning from their account I fear little revenue is to be expected this season from the Khureef crop; whole villages are deserted and the country in a state of desolation. Not a complaint has been made during these 25 days to me against the Sikh escort, whose conduct has been uniformly good.

On my return from yesterday's field day, inspected the two Ramgole regiments which I have embodied from the three after weeding them; they are now a respectable body of men, but require 500 to complete these I intend to take from the able-bodied fort garrison.

28th May —A seizure of 100 camels laden with contraband salt has been made near the Kohat district, of late years this contraband trade has flourished to the great detriment of the revenue. To give it a check at once, I have recommended the owners to be fined rupees 2,000, or their camels to be sold on the public account the zemindars who gave the information which led to the seizure to be liberally rewarded.

The city is full of the rumour of the advance of the Persian army on Herat, and of our Envoy having retired in disgust. Can the arrival of the Cabul vakeel be in any way connected with this? He has gone to Sirdars Sultan and Peer Mahomed in the Doaba, having obtained my sanction.

I am told that some of the Artillerymen recently arrived are mutineers and bad characters. I have ordered an inspection parade of them for to-morrow.

29th May 1847 — Inspected the men of the three corps of Horse Artillery lately arrived, and in front of the whole directed the Artillery General to call upon the officers to point out any disaffected or mutinous characters in order to their being returned to Lahore. Any officer withholding information should be held personally responsible after this.

\* 20 of which are unfit for the service. The Governor was present.

On Monday I hope to finish the second muster and first instalment of pay to the Ramgoles. It is a work of time, as each man is first to be minutely examined and then paid in my presence. If I am called away for an instant an uproar immediately ensues. With all my care I find last month 17 false names received twelve months arrears of pay. The original men had long since died or deserted. I have directed the amount to be recovered from the officers and clerks (Dustries).

Intelligence from Cahul up to the 24th is that there has been a fight between the Kuzzelbash and Rekhta Khanees, Sheahs and Soonees, in which 70 men were killed and wounded, several of note among the former. The Ameer sent his sons Gholam Hyder Khan, Mahomed Ameer Khan and Shere Ali Khan to try and stop it. The two latter joined in the fray on the Soonees' side and themselves wounded two men. The Sheahs were defeated and are said to be longing for revenge.

Reports were rife that Sikh troops were daily arriving here and that the Governor General with an army had reached Lahore. The Ameer's mind was much disturbed and he was enlisting men. The Khan of Bokhara is reported to have marched three months since towards Shihir-i-Subz, Kafilas from Cabul were delayed at Khoolum in consequence.

The party which conveyed the remains of the late Shahjahan Akbar to that city had returned. All is well here.

GEO ST P LAWRENCE, MAJOR,  
Principal Asst to the Agent, G G N W F,

No. 18.—Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor General, North-West Frontier, at Peshawur, from Sunday, the 30th May, to Saturday, the 5th June 1847.

30th May 1847.—Transacted no business The troops were out at a general parade for inspection by the Governor.

31st May — At a meeting with the Governor and Deputy Governor, Hakim Raic, we carried out the Durbar's orders confiscating 18 out of the 20,000 rupees jagheer enjoyed by Kumudodeen Khan for the protection of the road We have told him that until arrangements are completed for the safeguard of the road, he will be answerable for it

1st June —Sirdar Sultan Mahomed called on me on his return from the Doaba, he is loud in praise of the arrangements of his brother Sirdar Peer Mahomed, who keeps up two guns and a respectable force of horse and foot on his jagheer, while his other brother Syed Mahomed has hardly a soldier, spending all his substance, no one knows how; he refused to see Sultan Mahomed, or to render any account of the horse and foot he is bound by treaty with the Sikhs to keep up. As the Durbar look to Sultan Mahomed for the due fulfilment, on the part of his brothers, of the terms on which they hold their jagheers, he is naturally desirous of forcing Syed Mahomed to perform his part of it I have told him he can do as he pleases.

2nd June —A proclamation was issued by the Governor a few days since to the effect that any one giving or taking bribes would be severely dealt with and the money confiscated; my Moonshee reported that he was offered 100 rupees by the Tusheeldar and door-keeper of the Gor Khuttry, a man named Bhaug Singh, said to have amassed a considerable fortune within the last seven years by levying contributions on all petitioners and others who required access to the Governor

I told the Moonshee to take the money, and I would make an example of the giver, the money came. I fined Bhaug Singh 200 rupees which I lodged with the 100 previously given in the Government Treasury, and recommended his immediate dismissal from Government employ, which was done

The Churunjeet Regiment of Cavalry arrived from Lahore; the Khas Regiment march on the 4th

3rd June 1847 —The Governor and Deputy were with me for three hours inquiring into the jagheers and pensions, which amount in this Province to the enormous sum of Rs 68,104 per annum

We have made over the protection of the road hence to Attock to Jaffer Khan, Khuttuckee from Khairabad to Nowshera and thence to Chnmkunnee to Futteh Khan and Nishan Khan The former is a Jagheerdar to the extent of Rs 10 000 a year, for which he rendered no service the two latter have likewise jagheers of Rs 1,200 per annum, to this we have added Rs 500 and thus do for this small sum, what cost the State Rs 20 000 a year!

The Cahul vakeel took leave yesterday, and started this morning well pleased with his reception I gave him a *scarful*, and pair of shawls to the value of 150 rupees.

4th June —The corpse of a man killed in a village affray yesterday was laid at my door this morning the parties are prisoners. The subject of dispute arose from a horse straying in the fields, but an old feud existed the case is under trial

The Khas Regiment of Cavalry relieved by the Churunjeet Regiment, marched this morning towards Lahore they regret leaving Colonel Kahn Singh who commands them is smart and intelligent, and I shall be glad to get him back

I find some difficulty in getting Artillery Officers to give in the names of their men of bad and turbulent characters I have told the General that I know there are several and they must be pointed out they are still afraid of their men

5th June —Last evening in discharging some 600 of the Ram goles two native officers showed an inclination to disturb the peace I had them seized and taken to the guard which they had hardly reached when one complained of being ill lay down and was dead in an instant, the men set up a howl, and symptoms of turbulence arose Lieutenant Lumsden on one side and I on the other shouted to them, and though the body was carried through the middle of them, beyond an occasional wall nothing occurred I went on selecting the men to remain and those to go, as if nothing had happened

I am happy to say they are now down in numerical strength to 2,369

No recent intelligence from the west.

GEO. ST. P. LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G-G., N-W. F.*

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No 19.—Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 6th, to Saturday, the 12th June 1847

6th June 1847.—Orders from Lahore received this morning countermanding the march of the Khas Diagoons fortunately I had halted them about six miles off anticipating this, having heard from the Resident that it was in contemplation

On arrival at Peshawur, I found all the parades under cultivation up to, and even between, the men's lines This I at once put a stop to; each officer and man had his little field, and, of course, the water was taken from the zemindars

Between the Artillery and one of Colonel Holmes' Regiments the ground formerly allotted for exercise had been appropriated to himself by a Fakcer, who had built a house, garden, tank and well, the two latter, with the house, I permitted him to retain, but directed the wall of the garden to be removed and the ground to be resumed for its original purpose, this has lately been done This morning I heard that the Fakcer had been freely censuring the General for his tamely agreeing to my suggestions, and talking to the Sikh soldiers in an inflammatory way I have therefore directed the General to send a Naik and six to seize and convey him across the Attock as a dangerous person to have among the men

The Jagheerदार Horse, said to be 1,500, under Sirdar Kahn Singh, have arrived within four miles of the city I take their muster to-morrow with that of the Churunjeet Regiment of Cavalry

7th June —Inspected the Jagheerदार Horse, now said to be 1,000 under Sirdar Kahn Singh, Mujeetea, and allotted them ground for a



cantonment Orders arrived for the Churunjeet Regiment of Cavalry to march to Hazarah

Sirdar Sultan Mahomed urges the expediency of compelling his brother, Syed Mahomed to keep up his quota of horse and foot and to pay attention to the affairs of his Jagheer

With Dewan Hakim Raie I examined the various purwannahs for religious grants which occupied us some hours I have had all the liquor shops concentrated in one house in the city, over which I have put a guard to prevent affrays and to disarm all soldiers drinking to excess The General has done the same by the various grog shops in the lines

8th June 1847 —Hearing that there was an assemblage of Afreedees near Adyrye, bent on plundering the villages in their neighbourhood, I sent my Chupper Bashee, and some of the Guide Corps to ascertain its truth, finding it was correct I have ordered a small party of Afreedee Horse out to watch their movements and send early intimation

I have at length got the names of ten of the Artillery disaffected and bad characters from General Elahee Buksh and it is deserving of notice that some of them were ringleaders in turning the General himself out of his command during the reign of terror I have directed them to be paid up and sent across the Attock forthwith

9th June —Several affrays having recently taken place in the villages around, the Governor is anxious to put a stop to them, and has therefore sentenced two men to be hung to-morrow convicted of killing another I wished to submit the case for the Durbar's orders but as they represent that an immediate example is necessary I have consented to their execution and trust it may have the desired effect

In conjunction with the General, leave of absence to the extent of a fourth of the troops has been granted all proceeding on leave are warned to return punctually, to proceed together, and to be careful to commit no misdemeanour or outrage *en route* under penalty of forfeiture of future indulgence, loss of service etc strict attention to be paid to seniority of claim the corps that have been on leave not now to participate

10th June 1847.—I regret to say two more men were murdered last night by a party of nine, three of whom I have apprehended and am now trying the cause a woman, sister of one of the murderers

The extreme penalty of the law was carried into effect this morning on the two convicted of murder: it being the second execution since Avitabile's departure created a great sensation, and an immense crowd were present

I had all the heads of the police with two companies of Ramgoles in attendance, and all went on well and orderly I have directed the bodies to remain for some days, and have had the crime and sentence proclaimed throughout the city and neighbouring villages.

11th June —Took the muster of 280 Ghorechurras, good looking men, but indifferently mounted; the remainder are to be seen to-morrow

The Governor and Deputy were with me for some hours to-day; they appear to work better together. We have sent for all the Eusufzye Khans to try and make a settlement of their disputes and revenue

A Hindostanee Ramgole cut a prostitute down in the city and then killed himself, the unfortunate woman can't live

12th June —Two of the nine men concerned in the murder on the evening of the 9th have been convicted and sentenced to be hung this evening and five more to be imprisoned with hard labour for five years; the other two have not yet been apprehended

Under instructions from the Resident Lieutenant Lumsden starts for Hussun Abdall on the 15th instant to be employed in that quarter for the next month; most men would growl and grumble at being detached in such weather, and therefore the wish was merely expressed that he was there his zeal, however, outweighed all personal considerations, and he would have started on the instant had I let him Mustered the remainder of the Ghorechurras 474, so that instead of 1,000 as reported their strength is 754, quite enough; they do not look the sort to get work out of.

The execution went off quietly, and I am told by the Urbobs, etc, that it's so quickly following the crime will have a most beneficial effect

No recent authentic intelligence from the west.

GEO ST P. LAWRENCE, MAJOR,  
Principal Asst to the Agent, G-G, N-W. F

No 20 —Political Diary of Major George St P Lawrence, Principal Assistant to the Agent to the Governor-General, North West Frontier, at Peshawur, from Sunday, the 13th, to Saturday, the 19th June 1847

*13th June 1847* —Nothing worth recording at the request of the General, the usual Grand Parade was excused this being a festival day

*14th June* —The Governor and Deputy were with me for some hours transacting business

An elephant, fully caparisoned, arrived from the Durbar for my use.

Attended a Grand Durbar at the Governor's, at which I presented him with his Khillut of investiture as Sirdar, and took the opportunity of expressing my gratification at such an honor having devolved on me, and reiterated my hope that the officers present by following the example of Sirdar Golah Singh, might be thus rewarded the Sirdar had every Officer down to the Junior Jamsdar and many Privates to dinner of which 1400 partook Illumination, fire-works and *nautching* concluded the joyous day

*15th June* —I was to have taken the muster of the Khas Dragoons this morning but at the request of the officers postponed it till to-morrow to admit of their enjoying the Governor's hospitality to the full the same cause delayed Lieutenant Lumsden's departure for Chuch, which was fixed for this day

Ram Sahale's regiment of Infantry has crossed the Attock in progress from Pind Dadun Khan to this

*16th June* —Took the muster of the Khas Dragoons, and selected 82 of all ranks bad characters and unfits and have ordered them to Lahore.

Transacted revenue and judicial matters with the Governor and Deputy Lieutenant Lumsden started for Hussun Abdall by order of the Resident to remain in that neighbourhood till the arrival of Lieutenant Nicholson he overtakes his camp at Nowshera

*17th June* —At my weekly Durbar the Urbahs and others congratulated me on the prospect there now was of the constant village

affairs being at an end; that hitherto the people thought I would only imprison, they had now found out their mistake. I trust they are right, though I have my doubts.

I have had the bodies of the men executed interred beneath the gallows.

A Persian letter mentions the escape of Lieutenant Lumsden from drowning, he had put a charpoy, or native bed, on inflated skins in the Cabul river at Dohundee, intending to float down to Nowshera, and had gone some miles, when the skins burst and he with his attendant was immersed in the water, from which with difficulty he was extricated, losing his sword, pistol and clothes.

*18th June 1847*—Mustered the officers and non-commissioned officers of the Khas Diagoons (dismounted), and reduced seven Janadars, five Havildars and six Naiks in excess to the establishment.

I regret to say that a report from Khuttuk has just reached of a village affray, in which one man has been killed and seven wounded, the cause—non-fulfilment of a marriage contract; the parties engaged have absconded, but I hope to catch them.

*19th June*.—Colonel Ram Sahare Singh's regiment of Infantry marched into cantonments this morning, said to be 700 strong, he with all his officers waited on me this morning. This is one of the corps of General Sirdar Golab Singh's old Brigade which accompanied him to Cabul.

Took the muster of 44 Ghorechurras, under Bhookum Khan.

A letter from Lieutenant Lumsden confirms the Persian report of his narrow escape. I am happy to add he is not the worse for this ducking.

GEO ST P LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G-G., N.-W F.*

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**No. 21**—Political Diary of Major George St P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 20th, to Saturday, the 26th June 1847

*20th June 1847*—The usual General Parades of troops. I intend to propose that this parade should be ordered for Mondays in future, as then I can attend, whereas now I do not.

In consequence of the great heat I have recommended the discontinuance of all parades for exercise at present, and drills only to be out in the morning the men are of course highly pleased

21st June 1847—Transacted business with the Governor and Deputy examined into several religious grants etc, had all the Eusufzye Khans and many Mulliks to pay their respects

Mustered Ghorechurras and inspected 72 recruits (Infantry) arrived from Lahore posted them to Colonel Meer Jung Ali's regiment.

To the great delight of the Ramgoles I have granted them leave of absence to the extent of one-fifth officers non-commissioned and men this is the first indulgence of the kind they had ever had

22nd June—Intelligence from Cabul up to the 15th instant is that the Ghilzies of the Bahaka Khael (Mahomed Shah Khans) had plundered some travellers near Seh Baba and that the Ameer had sent a thousand men with two guns on elephants, who attacked them took their Fort of Gogomandee, and gave it with the plunder for 2,000 rupees to their enemies. On the 9th it was reported to the Ameer that Sirdar Sultan Jan and Mahomed Afzal Khan, son of Shabohdeen Tookhee, had plundered a Kafilah and killed some of the people near Khilat i Ghilzie, the Tookbees and Huzaras aiding them

The Ameer is said to have received some letters from the Urbobs of Peshawur and Durreab Khan Adyzyle. An *Elchee* from the Meer Wallee of Khoolum arrived at Cabul on the 14th instant.

Mirza Hoosain reached on the 11th. The Ameer appeared well pleased with the result of his mission he brought a letter from Sirdar Sultan Mahomed saying that if the Ameer wished to be on good terms with us and that his affairs should prosper, he ought to send a vakeel on whom he could depend to remain with me that Mirza Hoosain was not the man. The Ameer proposed to Nawab Jubbar Khan to go but he declined it was thought that Mirza Abdool Samee Khan would be sent

It was reported at Cabul that the Khan of Khiva hearing that the King of Bokhara had marched towards Shihrl-i-Subz had made a *chapaw* to within 30 miles of Bokhara, and returned with many thousand captives. The King on hearing this returned and killed with his own hand Nalb Abdool Summud Khan by striking him on the head with a hatchet his family and property were made over to the Vuzeer

23<sup>d</sup> June 1847 —Rode through the city at gunfire this morning to arrange a new disposition of the sentries. the guards have hitherto been posted in small details of six men, these I have concentrated in parties of 18 and 24, who will furnish sentries for their several posts, but be available as a body if required.

Transacted business with the Governor and Deputy in the affairs of the Eusufzyes which are most difficult to arrange, they are in such a state of anarchy and bad blood with each other

Another affray has just been reported to have occurred in the village of Mashoo Khail in which six men were wounded ; I have called on the Urbob, Mahomed Khan, to seize and bring in all the parties

24<sup>th</sup> June —A treasure party with two lakhs of rupees arrived from Lahore three were expected, the third is said to be *en route* but I doubt it.

Lieutenant Lumsden writes me from Hussun Abdall that there is nothing stirring there; a murder had been committed on a grass-cutter which was set down to the Gundghurrias, but he very much suspected unjustly; more likely to have been the act of some of his companions He informs me that the Churunjeet Regiment of Cavalry had halted, the Colonel said for pay I have ordered them off instantly to Huzarah and expressed my surprise at the delay they have made in what they know to be the Dui bai's instructions I have directed Lieutenant Lumsden to look after any troops in his vicinity, and to act in every respect as I do here till he receives the orders of the Resident

25<sup>th</sup> June —One of my purwannahs to send in a woman who had been forcibly carried off having been returned to me by the Mullick of Mashoo Gugger with his reply that he "had never attended to Avitabile, why should he to me?," at 10 P.M I quietly started 300 Cavalry and 600 Infantry under Colonels Alla and Mehtab Singh and by daybreak surrounded the village and seized the gentleman

I had purposed going myself, but the Governor came up in the middle of the night and so strongly urged me not, that I complied 18 or 20 swords and loaded matchlocks were brought in, which I have confiscated The Sikh troops, the Colonels report, as did my people whom I sent with them, conducted themselves most orderly

26th June 1847 — Lieutenant Lumsden reports that the Churunjee Regiment of Cavalry were to march from Hussun Abdall this morning for Huzara. Colonel Boodh Singh's Regiment of Infantry had arrived. All is quiet to this quarter

GEO. ST P LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G G, N W F*

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**No 22.**—Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor-General, North West Frontier at Peshawur, from Sunday, the 27th June to Saturday, the 3rd July 1847

27th June 1847 — The Officer Commanding 12th Native Infantry writes the Assistant Resident at Lahore to have a deserter from his regiment, said to be in Colonel Dhokul Singh's, seized and sent to the Provinces this appearing an irregular and novel proceeding I have referred it for the Resident's orders, and intend taking no steps in the matter till I hear from him

28th June — Sirdar Sultan Mahomed sent for my Mooshee and gave him letters he had received from Ameer Dost Mahomed with one to my address. Copies will be sent to the Resident, though they contain little of moment.

I rode over the Parade ground which I am having put in order, it requiring levelling draining etc.

Transacted business with the Governor and Deputy have at length settled with the Eusefzye Khans who took leave this morning, promising to cease from oppressing their people and to live in peace with each other. I have promised to reward those who have their lands in the best order on my visiting them in October

29th June — A lad of 18 or 20 of the village of Dulozie cut his uncle in two while lying asleep on his bed he acknowledges it, and says his uncle owed him money and in lieu of payment promised to give him his daughter in marriage. He gave her to another, and therefore he killed him

Mustered the remainder of the Ghorechurras with the Zamboor battery of 51 guns; all the camels are knocked up. I purpose sending

them to graze and posting the men with the Zamboors in the different forts.

Dewan Atma Singh, Vuzeer of Khoolum, who paid the late Sir W. Macnaghten a visit of some months at Cabul, writes me by name George Lawrence, as if he knew me well, and professes much service his letter arrived under cover to a banker in the city I shall answer him by the same channel.

30th June 1847—Rode through the city, which, notwithstanding the heat, appears crowded fruit selling in great profusion

Inspected Colonel Ram Sahare Singh's regiment, about 740 firelocks The men are a stout soldierlike set, but the officers no great things, all want much drill, which I have recommended their getting when the weather admits

1st July—Transacted business with the Governor and Deputy.

The lad who murdered his uncle was executed this morning during the time the Urbobs were with me I took the opportunity of warning them to exert themselves to put a stop to affrays and to report instantly, they appear to look but lightly on them, and I am pretty sure do not exert themselves as they ought.

2nd July—Nil

3rd July—Commenced paying the troops for the months of *Baisakh* and *Jath*, or from 12th April to 9th June The three troops of Artillery which arrived last month are six and eight months in arrears, and Ram Sahare's regiment four months They will be paid up so as to be on a par with the rest of the force

Report of a man being shot in the village of Budwair yesterday, but his father declares it was accidental, the case is under investigation.

No intelligence from the west

P S.—3rd July.—As I was about to close my Diary intelligence from Cabul up to the 27th ultimo arrived; Sirdar Sooltan Jan had arrived with his brother Mahomed Omer Khan on the 23rd

The Ameer was engaged in reducing the pay and number of troops employed by the late Sirdar Akber Khan, etc. The intelligence of Naib Abdool Summund Khan's death by the hand of the King of



Bokhara is confirmed His Majesty is also said to have dismissed the Persian *Elchee* who had some time previously arrived from Meshed, nothing else worthy of notice

GEO ST P LAWRENCE MAJOR,  
*Principal Asst to the Agent, G G, N-W F*

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**No 23** —Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor-General North West Frontier at Peshawur, from Sunday the 4th, to Saturday the 10th July 1847

*4th July 1847* —Rode to the cantonment called Rajah Suchet Singhs on the east of the city where I have located Colonel Ram Sahais regiment. Within gunshot of it on the highroad to Lahore are cantoned two troops of Horse Artillery, the Khas Dragoons and Khas Regiment of Infantry on the west of the city, in the Ali Murdan cantonment are the regiments of Meer Jung Ali Ruttan Singh Mehtah Singh Maun Singh, and Ameer Khan and Sohhan Khan, with four troops of Horse Artillery two on each flank, the rear is occupied by the Aukhafee Regiment of Dragoons and Ghorechurras under Sirdar Kahn Singh

*5th July* —Paid three troops of Horse Artillery four and six months arrears

Engaged for three hours with the Governor and Deputy in giving fresh purwannahs and enquiring into religious grants, jagheers, etc.

I have ascertained that an extensive system of kidnapping women and girls and selling them to brothel keepers and others has long prevailed in this Province, some engaged in it I have seized, and hope to put a stop to such nefarious proceedings I have imprisoned three notorious offenders

*6th July* —I have succeeded in getting three women and one child who were found locked up waiting purchasers. Two represent themselves to have been seized and brought from Kooner one from Eusufzye the child appears to know nothing about its parents or place of abode one woman I have made over to her friends.

7th July 1847.—Phuggoo Singh, Adjutant of Meer Jung Ali's regiment, brought me a pui wannah from the Durbar in reply to his application to be made a Commandant; they, as they have done in many late cases, throw the onus of refusal on me by telling him that I may appoint him if I like. I told him as reductions were the order of the day, it would not do to make new promotions.

Sirdar Sultan Mahomed Khan in his late visit went over the old ground of his great anxiety to do some signal service which would prove to us that he was sincere. "God forbid," said he, "that you should be put in any strait, but if it was so, then you would see the value of my gratitude and friendship."

8th July —Engaged with the Governor and Deputy in judicial and revenue suits

Had my weekly Durbar of the Urbobs and gentry

Shahzadah Hashum, son of the late Timour Shah, and grandson of Ahmed Shah, a pensioner of the Sikhs and resident in the city, has disinherited his sons, Shahzadah Mahomed Saleh and Shahzadah Abdool Wahab; their allowances he has discontinued, and they now are driven to live on charity. Urbob Mahomed Ameer Khan has given them present shelter and subsistence; they are worthless characters.

9th July —I have suggested to the General to call for a return of guards and orderlies furnished by regiments with a view to some orders being issued to reduce their numbers and introduce uniformity; at present Commanding Officers appear to please themselves very much in these matters.

The Ghorechurras are to receive four months out of 12 months pay due them. I have directed its being paid at my quarters, the same as that of the Regulars; they have their separate Paymasters the disbursement will commence on Monday, the 12th instant.

10th July —Nothing of moment; a slight attack of fever prevented my seeing the Governor and Deputy, notice of which I sent them last night.

GEO ST P LAWRENCE, MAJOR,  
Principal Asst to the Agent, G-G, N-W. F

No 24.—Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor General, North-West Frontier at Peshawur, from Sunday, the 11th, to Saturday, the 17th July 1847

11th July 1847.—It was reported by the Cutwall that consequent on the escape of a prostitute Ram Dass Commandant ex-Colonel of the 2nd Ramgole Regiment, took upon himself to order the gates of the city to be closed till after sunrise that some females of the Barukzye Sirdars going to Hushtnaggur were turned back from one of the gates because they would not show their faces I have requested the Governor to make strict enquiry into the matter

11th July —Intelligence from Cahul to the 6th instant is that the Ameer had at length settled the differences between the Morad Khances and Rekhtas and put the former under his son Akram Khan, the latter under Gholam Hyder Khan Azeez Khan Ghulzie had arrived at Cahul Mahomed Shah Khan had occupied the old fort of Kaffer Killa near Seh Baha and Sarobee and made up with different chiefs in the neighbourhood with whom he had previously been at issue. The Ameer had executed Dilawer Khan, son of Abdoolah Khan, Sahag, much to the annoyance of Gholam Hyder Khan some Ghilzies were at the same time put to death and had confined the son of Meer Derwesh Baba Khoosb Khanee, getting him on the pretext of enquiring into some complaints of theft. In open day bands of 30 and 40 Kohistanees plunder right and left.

13th July —Transacted business with the Governor and Deputy yesterday

Was to have dined at Colonel Ram Sahare Singhs, who had made great preparations,—fire-works, etc. —but an attack of fever prevented me the Governor and all the officers went.

Have been obliged to put myself under medical treatment.

Have, since my arrival had much trouble in getting the Cazeer to attend to his duties, he has sent many cases back to me without having made any enquiry into them and some which he had settled were so obviously unjust and opposed to reason that I assembled several learned in the law (Mahomedan) and reversed his decrees. I have consequently determined on removing him

14th July 1847 — Ram Dass, ex-Colonel, present Commandant of the 2nd Ramgole Regiment, took upon himself to order the gates of the city to be kept closed till after sunrise, consequent on the elopement of a nautch girl. After due enquiry into the case, I have fined him Rs 300. It might have led to an affray, as some of the Barukzye Sindars' females going to Hushtnuggur were stopped at the gates and called upon to show their faces; fortunately their escort did not resent the affront, but reported it to me.

Dawur Khan, of Mashoo Khail, *chapawed* by Lieutenant Lumsden on the 22nd April, sent me in 20 head of cattle which he had recovered from a band of plunderers who were driving them to the hills.

Transacted business with the Governor and Deputy.

15th July — Weekly Durbar of Urbobs and gentry, all tell me that in the best of Avitabile's days the country was never so quiet as it is now, or so free from casualties and offences.

The Governor and Deputy were with me for some hours.

Sirdar Sultan Mahomed proceeded to Hushtnuggur on a visit of condolence to his brother, Sirdar Peer Mahomed, on the death of one of his wives.

16th July — Reports from Cabul of the plunder of a Kafila bound for Peshawur by the Ghilzies near Tezeen.

Lieutenant Lumsden has reported being relieved at Hussun Abdall by Lieutenant Nicholson. On returning I have directed him to collect all the information he can of the Khuttuk district and its management under Ram Dass and his brother, Lalla Hakim Raie.

The payment of the Regulars and Ghorechurras proceeds under my supervision.

17th July — The parties engaged in the affray of the village Bahadoor, for which two men were executed, came to me yesterday, and requested I would send and take their arms, so as effectually to prevent a recurrence of it. I sent off a party who brought in 11 swords and 8 matchlocks.

I regret to say the Governor is laid up. I have recommended his keeping quiet for some days.

I have removed the Cazee and appointed Fuzel Ahmed, one of the sons of Cazee Mahomed, Hussun Khanee, Moollah of the late Shah Timour and Shah Shoojah-ool Moolk. He officiated for six months as Cazee at Cabul and was well thought of by the people, while his brother who succeeded him as being his senior, was just the reverse.

Sirdar Sultan Mahomed Khan returned this morning from Hushtnuggur

GEO ST P LAWRENCE, MAJOR,  
*Principal Asst to the Agent G-G, N-W F*

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**No 25.—Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor-General, North West Frontier, at Peshawur, from Sunday the 18th, to Saturday, the 24th July 1847**

*18th July 1847*—Paid the Governor an evening visit, to enquire after his health. I am happy to say he is better but a good deal reduced he said he would be with me to-morrow but I advised his keeping quiet for some days

*19th July*—Transacted business with the Deputy Governor and paid the Khas Pultun and 80 Ghorechurras

On enquiring into the reported execution at Hushtnuggur it turns out that a thief was cut down in the act of plunder and dying of his wounds the Sirdar's son had the body hung up for a day seven witnesses tell the same story, so I have told the young Sirdar he may return to his father's jagheer

*20th July*—Requested the General to order a court martial to assemble at my quarters to investigate the conduct of the Adjutant of Colonel Ram Sahai's Regiment reported to have been most in subordinate, it appears to have arisen from a soldier's wife (the Adjutant's orderly) complaining to the Colonel of the Adjutant having struck her

Rode over the new exercising ground which I have had made in front of the men's lines in the Ali Mirdan Cantonment.

*21st July*—Held the court martial at my quarters on Torab Ali Adjutant of Colonel Ram Sahai Singh's Regiment, accused of

grossly abusing his Commanding Officer; the court consisted of Colonels John Holmes, Mehtab Singh, Kahn Singh, Meer Jung Ali, and Maun Singh. The prisoner was found guilty and sentenced to suspension from rank and pay for two months the court wound up their proceedings by requesting I would give them Articles of War for their guidance and promulgation among the men.

The Governor with all the officers paid their respects, the old man is better, but much pulled down, the weather has become cooler, which is in his favor

An affray is reported to have occurred at Hushtnuggur in which three or four men were wounded. I have called on the Barukzye Sirdais in whose jagheer it is to send the parties in

*22nd July 1847.*—Transacted business with the Governor and Deputy The latter urged me to write to the Resident on behalf of his son, Dewan Kishen Cower, ex-Kardar of Rawul Pindie, I replied that I had already done so, but as no reply had been vouchsafed the subject was evidently not agreeable

Held my weekly Durbar of the Urbobs, at which there was much discussion as to then not only not assisting Government in suppressing the salt contraband trade, but that by many they were accused of aiding and benefiting by it. I warned them that if proved they might rely on losing their jagheers

*23rd July*—Some villagers complained of the sepoy's of the Khas Pultun cutting off the water from their fields I sent the parties to the General to have the case investigated, with instructions to punish the men if guilty.

To show the difficulty of ascertaining who are deserters from our army, I may mention that in the recent issue of pay to the Dhokul Singh, or Poorbeah Pultun, I took down the name, without their being aware of it, of each man who struck me from his appearance as having been one of our sepoy's, and I find by my list I have 90 down, not one of whom, I am quite sure, is under his proper name, all have borrowed names, and many of them, I have no doubt, have been discharged for different offences. I also got their long roll to examine; few have put down their villages or purgunnahs, but chiefly large cities as Lucknow, Bareilly, Cawnpore, etc

24th July 1847 —Sirdar Peer Mahomed sent in a man suspected of having wounded another I enquired into the case, but there being no proof dismissed it. I mention it to show that the recent orders of the Durbar to send in all such cases are now attended to

A disturbance arose in the city which, if the parties had not been promptly seized, might have led to serious results a Hindoo and Mahomedan quarrelling set to abusing each other's religion and a crowd was attracted and sides taken the Police however interfered and took them to the Governor, who sent them to me. I imprisoned the principals, first having them well flogged and fined all the rest

GEO ST P LAWRENCE MAJOR,  
*Principal Asst to the Agent, G G, N W F*

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No 26 —Political Diary of Major George St P Lawrence, Principal Assistant to the Agent to the Governor General, North West Frontier at Peshawur from Sunday, the 26th, to Saturday, the 31st July 1847

25th July 1847 —The Governor General Golab Singh, paid me a friendly visit before breakfast this morning and sat for an hour and a half, we complimented each other on the improved state of the Province

I have directed Sirdar Kaho Singh to order out every morning 80 or 100 of his Ghorechurras to make an 8 or 10 mile circuit of the country with a view to show the people we are on the alert, as also to give the horsemen a knowledge of the country

26th July —Transacted business with the Governor and Deputy they arrived at 7 and were with me till half past 10 A M

Some petitions having been lodged by Ramgole sepoy complaints that Colocel Dhoo Raj had issued orders putting them to unnecessary expense by changing their dress etc., I requested the General to investigate the matter. He reports the complaints to be false, and to have been made at the instigation of ex-Colonel and Commandant Ram Dass, through the medium of a Nalk of the 2nd Regiment whom I have ordered to be discharged forthwith

Several Bunneahs have been detected mixing Indian corn with atta, and have been fined

Sirdar Sultan Mahomed sent to say he purposed calling to-morrow

*27th July 1847* —Sirdar Sultan Mahomed Khan, after mutual compliments, asked for a private interview, he was attended by Naib Mahomed Shereef, our pensioner, I had my Moonshee. To my astonishment all at once he told the Naib to produce the Koran, which he had under his cloak, and ere I could say a word he put out his hand on the book and swore most solemnly that his whole and sole aim was to retain our good opinion and prove his gratitude at being restored to his home; that his brother the Ameer was his bitter enemy, and much more to the same purpose. He said that Sirdar Sultan Jan had written from Cabul that he was at his service for any work, and was ready to join him at Peshawur, he asked should he tell him to do so. I replied "by no means." My Moonshee says his object in making this solemn declaration is that, as he has many enemies at Lahore, he fears their representations may injure him in our estimation. I directed the Moonshee to take notes of the meeting

This is the first morning I have had to myself for three months, and I enjoyed it very much. What with settling the affairs of the Ramgoles and paying the Regulaïs, I have been engaged every morning from daybreak

*28th July* —A good fall of rain last night, will give us cool weather for the next week. This being the Mahomedan festival of *Shub-i-berat*, I had no kutcherry, the first holiday my establishment have had.

An order has arrived from Sirdar Tej Singh recalling Colonel Ram Sahae Singh of the Artillery, reported by me to the Resident for making false returns. As the General considers the Commandant, Adjuthia Pershaud, equally implicated, I have requested he be sent also with the Major and Moonshees

*29th July* —An order recalling the Deputy Governor, Dewan Hakim Raie, arrived last evening. I have assented to the Governor's



proposition to allow him to remain pending a reference to the Resident and Durbar. His recall has been caused by his (in a letter he wrote me some time ago) styling himself Governor, etc

The recall of Colonel Bukshie Singh has alarmed the Artillery Commandants. It was reported last evening that several hundred maunds of grain and *bhoosa* which ought to have been given to the Government cattle had not. They now wished to know what was to be done with it. I have ordered it to be carried to the account of Government and told the General to explain that in future any curtailing of the food of the cattle or appropriation of Government property will not be passed over and that I shall hold the Colonels responsible.

30th July 1847 —The Governor and Deputy were with me for three hours. I have directed the latter to continue his duties till further orders. He is very much downcast at his recall, it will do him good and frighten others.

Rode through the city last evening and was joined by Sirdar Sultan Mahomed Khan whom I accompanied to his house, and sat with him some time. He showed me some 50 or 60 English and French mirrors he had brought from Lahore with chandeliers, wall shades, etc to the value of a lakh of rupees. He is building extensively at the Wuzzeer Bagh.

31st July —Lieutenant Lumsden arrived this morning, looking all the better for his trip.

In my grounds is an extensive tank in which I have allowed the Sikh troops to bathe, much to their enjoyment. It requiring clearing out this morning 500 or 600 of the men of their own accord came and in half an hour cleared it appearing to enjoy the fun.

I have just heard of an engagement having taken place three days since in the Khyber between two clans, several wounded and killed on both sides.

We are going to pay the Governor a visit this evening, I am happy to say he is quite recovered. All well in this quarter.

GEO ST P LAWRENCE, MAJOR,  
Principal Asst to the Agent, G.-G., N. 1

No 27.—Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 1st, to Saturday, the 7th August 1847.

*1st August 1847*—I find I omitted in my last week's Diary to notice the arrival on the—————of a treasure party with 1,14,000 rupees from Lahore

The Governor and Deputy started early this morning to inspect the forts of Jumood and Bairah.

*2nd August*—A grand parade this morning of all the troops, regular and irregular marched past in review in open column of troops and companies, about 2,000 Cavalry, 500 Artillery and 5,000 Infantry. The men were very steady and looked remarkably well.

Transacted business with Governor and Deputy; they seem to have enjoyed their visit to the forts yesterday, which they report as requiring petty repairs. Lieutenant Lumsden astonished the officers by showing them some gun-cotton and its effects he made a paper cannon from which he fired some shots to their great surprise and amusement. They wanted to present *nuzzis* on his escape from drowning, but I told them it was unnecessary; their congratulations were sufficient

My special messenger, deputed on the 30th with a purwannah to the Mulliks of Nowdeh and Kulloo in the Eusufzyes (*sic*), has returned with a positive refusal from them to obey it they say they will only pay revenue as they please, I may send troops against them or do what I like. They are close to the hills, and think they are safe, I hope ere long to show them their mistake.

*3rd August*.—Intelligence from Cabul up to the 27th ultimo is that Gholam Hyder Khan has been appointed Vuzeer, and his half brother, Sirdar Sher Ali Khan, Governor of Guznee Meer Durwesh Khan Baba, Khoosh Khanee, had been released from confinement on paying a fine of 5,000 rupees. The country was in its usual disturbed state.

Sirdar Kahn Singh has been laid up for some time and yesterday was dangerously ill I offered Mr Thompson's services, and with Lieutenant Lumsden paid him a visit. glad to find him much better. I sent him some hubarb *shurbet* from Cabul, which is highly esteemed.

*4th August*—A fire broke out in one of the bazars, but was quickly put out without doing much damage

*5th August*.—Transacted business with the Deputy Governor.

Sent Mr Apothecary Thompson to attend on the Governor, who is reported dangerously ill

At about 9 A.M. the powder manufactory in the city blew up completely destroyed 34 houses one of which was the mint, and part of the city wall 8 people were killed on the spot, 5 died shortly after, and 34 were more or less wounded, one man was killed herding cows a quarter of a mile outside the city by a brick falling on him, many houses in the city were shaken I sent Lieutenant Lumsden with all the beldars to the spot, they succeeded in rescuing one man who was completely buried in the ruins, but uninjured The police were very active and useful keeping the crowd, which was immense, from the ruins Lieutenant Lumsden praises them much I have directed the wounded to be sent to my hospital In the evening I repaired to the scene, which was distressing to view

6th August 1847—Mr Thompson remains in attendance on the Governor the Hakeems were killing him fast by giving him cold applications instead of hot I sat with him some time this morning

Held my usual weekly Durbar of all the Urbobs yesterday

7th August—Visited the Governor this morning he had a good night, and is now, I trust out of danger he will not part with Mr Thompson, whose attention and skill he justly appreciates

A man from Khuttuck for the murder of his wife was executed this morning He suspected his wife of infidelity but without taking her to task or the least proof or enquiry cut her to pieces I have had his crime and sentence proclaimed through the city

In Cabul there are three Armenian families, of twelve members. One of the Ameer's sons hearing of the beauty of one of the girls sent to the father for her on his refusing on the plea of their difference of religion, the young Sirdar sent to say he would take her by force Some friends of the family have asked me to write to the Ameer and banded me as to

I have told Major Lawrence that there can be no objection to give such person protection when once across the frontier

H M LAWRENCE  
Agent to C C

LALL BE  
August 16th 1847

whether I would give the girl shelter and protection should they be able to bring her to Peshawur I regret not deeming myself at liberty to reply

GEO ST P LAWRENCE MAJOR  
Principal Asst to the Agent G G, N W F

No. 28.—Political Diary of Major George St P Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 8th, to Saturday, the 14th August 1847.

*8th August 1847*—We visited the Governor this morning, and I am happy to say he is progressing famously; he will hardly admit one of the Hakeems into his presence, while he scarcely lets Mr. Thompson out of his sight

*9th August*.—Transacted business with the Deputy Governor I have ordered trees to be planted throughout the Province, each Jagheerdar and pensioner to plant and take care of a number according to the extent of jagheer or amount of pension in land, at present hardly a tree is to be seen.

The troops paraded under their Commandants on their respective parades

I have granted two months' leave to Colonel Dhun Raj, Commandant, Rangoles, a young man, but most respectable, active and intelligent officer, and one month's leave to Dewan Jowallah Sahale, Killadar of the Fort of Jumrood

*10th August*—I refused to receive Mahomed Shah Khan Ghilzie's Agent, who brought his master's letter, and desired that merely a receipt should be given for it. His impudence in addressing me and styling himself the friend of the English beats anything I ever heard

He was the instigator of the murder of the Envoy and more than once advised the destruction of the prisoners. On one occasion as I remonstrated with the late Mahomed Akber on the cruelty of dragging about the country helpless women and children, and was flattering myself on having made an impression, Mahomed Shah Khan with a fiendish grin replied, "Lawrence Sahib, listen to what I have to say. As long as a Red-coat is in this country, so long will your women and children be dragged about; where they can ride they may, where they cannot, they must walk, where they cannot walk, they must be carried; and when they can no longer be carried, their throats shall be cut!"

He is the Chief who carried me off on the fatal 23rd December, not from any wish to save my life, but from considering me more valuable alive than dead

11th August 1847 —A second purwannah arrived last evening from the Durbar recalling the Deputy Governor, Dewan Hakim Raie, so I have coosented to his going, but am sorry to lose him though the Resident would let him remain, still, as he thinks the example will be of use, I will do the best I can to supply his place

Rode through the city this evening and visited a remarkable well whose water in the hottest day is almost as cold as ice, It is drawn upon by the whole city I keep a guard on it to preserve the peace

12th August.—The Governor called to his Palankeen and sat a few minutes. I would not let him remain, he looks still so ill and is so very much reduced. I have told him not to move out again till he becomes stronger On Mr Thompson leaving him last night he presented him with 125 rupees which was declined The Governor then sent the purse to me and begged I would direct Mr T to take it I returned it, saying I would first obtain the Resident's sanction as a special case.

Of 5 000 shot sent from Lahore 400 only have arrived, the remainder are reported to be left at Rhotas for want of carriage. 40 hullocks are said to have died *en route* in conveying the above

13th August.—In my Diary of the 7th instant I reported the case of the Armenians at Cabul, yesterday I received a letter from them much to the same effect. I have consequently determined on writlog privately and friendly to the Ameer and mention what I had heard and request his interference for their behalf

I held my usual Durhar yesterday of the Urbobs, and arranged with them to atteod at sunrise during the month of *Ramzan*

Under orders from the Durbar reducing the Cavalry regiment to 550 sabres, the Governor selected three officers nine non commissioned three trumpeters and 94 sowars of the Aukhalee Regiment and started them for Lahore with the ex Deputy Governor, Dewao Hakim Raie.

At the request of the Mahomedan population the Governor has ordered the morning gun to be fired during the *Ramzan* an hour before daybreak.

14th August —I called at sunrise on the Governor and transacted busloess to save his coming to me

Some Moollahs at Hushtnuggur have had an affray in which several men have been wounded, and the chief Moollah, whom I had ordered to be apprehended and brought to me, has died of his wounds, it seems he did his best to excite a serious commotion but failed, there are said to be three or four more of his set ill-disposed whom I hope to lay hold of ere long. I have fully explained to the Barukzye Sirdars that I shall hold them strictly responsible for any breach of the peace within their Jagheers.

I have no recent intelligence of any consequence from the west, but matters are much as usual in that quarter, here all continues well.

Geo St. P. LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G-G, N-W F*

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No. 29 —Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 15th, to Saturday, the 21st August 1847.

*15th August 1847* —I fear there is no chance of my apprehending the Gundghurrias, who are represented by Captain Abbott to be among the Eusufzyes it is a point of honor among all these tribes not to give refugees up and one of the few they adhere to most devoutly.

*16th August.*—Lieutenant Lumsden inspected the troops this morning while I visited the Governor and with him transacted business; we inspected the Khas Regiment of Cavalry, and reduced their non-commissioned officers and sepoys to the new establishment

A Mullik of Mitchenee, who had a suit in court which was given against him, took upon himself with 100 men to stop a merchant's *jallah* or float proceeding by the river from Jellalabad and sent word to me by the owners that he would keep the goods till I gave him redress Mitchenee being in Sirdar Sultan Mahomed's Jagheer, I wrote him to do the needful and produce the Mullik before me

I heard of the body of a woman and child being found with their throats cut near the village of Lundy yesterday, no report has yet come from the Urbob of this double murder.

*17th August.*—Visited the Governor and transacted business, he will soon be going about; we arranged to send Colonel Holmes with a regiment of Cavalry, one of Infantry and four guns to the Eusufzye

country to collect the revenue scarcely any having been paid in and some villages having sent a flat refusal which it will never do to allow to pass.

Intelligence from Cabul up to the 11th instant is that the Ameer is engaged in taking the muster of his troops, and after paying intends sending a portion under his son, Sirdar Mohamed Afzul Khan, to collect the revenue of Tegaon. Mahomed Shah Khan, Ghilzie was paying off old scores on the tribes who had assisted the Ameer recently against him. Sirdar Mahomed Ameen Khan and 1,000 horse had been sent against him from Turkistan. The ruler of Khokand Mussulman Khool is said to have been deposed and killed and Khymla Beg, son of Sarm Sak Beg of the blood Royal placed in his stead. The Russians are reported to have built a fort within six or eight marches (150 *koss*) of Khiva, which they have garrisoned with four regiments and eight guns.

The merchandise from Cabul detained at Mithencee has been released but the Mullik not yet brought in.

*18th August 1847*—Visited the Governor and transacted business. I have recommended small sums to be given to the proprietors of the houses recently blown up by the gunpowder explosion and that the manufactory should in future be carried on a short distance from the city.

We get on much better without the Deputy Governor, Hakim Raie than I expected, it has caused the Governor to exert himself.

Hearing that an Irishman named Ramsay who had been many years in the service of Ursallah Khan of Zedah (Eusufzye), was in the Artillery of Sekunder Khan at Hussun Abdall I requested Lieutenant Nicholson to send him to me. He reported himself this morning he has difficulty in expressing himself in English, but speaks Pushtoo fluently. He declares he never was in the British service, but I doubt him, that he worked his passage to Bombay 15 years ago as a sailor deserted the ship and joined a Kafilah of Mahomedans, whom he accompanied to Swat but by what route he declares he knows not. I shall keep him here for some time to get all the information I can out of him.

*19th August*—Visited the Governor in the morning and transacted business. fixed the march of Colonel Holmes' detachment for to-morrow.

Lieutenant Lumsden rode to the village of Lundy seven miles to the south-west to investigate the circumstances attending the murder of the woman and child but gained little information beyond satisfying himself as to the locality

We visited the Fort of Shahmeel Ghur in the evening to inspect parts said to require repair

A paurannah arrived from the Durbar ordering the troops to be out at exercise twice a week in the hot and four times in the cold weather. although there is a sensible change already in the mornings, I will wait 15 or 20 days ere I act upon it. I am happy to say as yet the troops are very healthy, but the next month is said to be very trying, and bad fevers prevail

The Governor and Sudar Kalm Singh. I am happy to say, are quite recovered

20th August 1847 — Visited the Governor and transacted business

The detachment under Colonel Holmes marched this morning. When they have crossed the Cabul river at Jangheera Lieutenant Lumsden by a forced march will join them, and then with the Cavalry push on and surprise the villages of Nowdeh and Kulloo, whose Mulliks have refused to pay their revenue, he will then *chapaw* the village of Gurry, where the Gundghurias are said to have taken refuge when they fled from Captain Abbott's troops. It is the only chance I see of our seizing them, for the people or Khans will not give them up.

Held my weekly Durbar of the Urbobs, but at 7 A.M. instead of 11 on account of its being the *Ramzan*

21st August — Visited the Governor and transacted business. We have arranged to inspect the repairs required in the Fort of Shahmeel Ghur and meet this evening for the purpose

No more recent intelligence from the west than is detailed on the 17th. All is well here, and the troops continue to please me in every respect.

GEO. ST. P. LAWRENCE, MAJOR,  
Principal Asst to the Agent, G-G, N-W F



No 80 —Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor General, North West Frontier, at Peshawur, from Sunday the 22nd, to Saturday, the 28th August 1847

22nd August 1847 —A special messenger arrived from Lahore with a letter from the Maharajah complimentary and sending an elephant for my use to replace the one previously sent the new elephant however died *en route* at Rawul Pindee

23rd August —Lieutenant Lumsden started at 2 A.M to overtake the detachment under Colonel Holmes, accompanied by Colonel Alla Singh

The Regular and Irregular troops paraded this morning under General Golab Singh for my inspection Sirdar Kahn Singh made an apology for the line his Ghorechurras formed saying it was new to them I replied that I had no doubt they would soon get into the way of it 70 of them have proceeded with Colonel Holmes detachment

24th August —Transacted business with the Governor circulated the Durbar's proclamations prohibiting "Slave dealing," "Seizure of Begars" "Suttee" and "Infanticide" the two latter I have not heard as practised in these parts An oversight appearing to me to have occurred in the Begaree proclamation it not including forced labour which Jagheerdars and Ijarahdars (contractors) take out of the people I have caused the Governor to add it to his as being the spirit though not letter of the Durbar's order

A report from Bahram Khan, Zedah, of an affray in which two men were killed five men and five horses wounded Lieutenant Lumsden will investigate it.

Commenced the issue of pay for the months of *Har* and *Sawun* (13th June to 15th August) to the troops as usual in my own verandah.

The Ghorechurras being ten months in arrears, and not having sufficient funds in their chest to give them four months' pay, I have offered Sirdar Kahn Singh 40 000 rupees from the Civil Treasury to be repaid on the arrival of assets from Lahore.

25th August —The corpse of a young man killed in an affray yesterday in the Doaba was brought to me there being no external marks of violence, I had the body opened Mr Thompson reports death

to have been caused by the bursting of a large blood vessel from a blow ; the parties are in confinement

I have been taking an inventory of stores in the Fort of Shahmeer Ghur, and in the article of lead alone found a defalcation of many hundred maunds the Governor has reported it to the Durbar.

*26th August 1847* —Held my weekly Durbar of the Urbobs ; they all express themselves well pleased at the proclamations prohibiting " Slave dealing," " Suttees," " Infanticide " and " Seizure of Begar," and say that it is by such just measures the British rule and fame is so renowned

Colonel Holmes reports arrival in the Eusufzye country and that revenue was already coming in, he wants a treasure chest.

*27th August* —Sudat Peer Mahomed has been taken seriously ill and has sent for his brother, Sirdar Sultan Mahomed Khan, who has proceeded to him

Sirdar Kiln Singh, Mujetta, now declines receiving any advance for the pay of the Ghorechurias, saying that he is afraid the Durbar would not approve of it. I have requested the Governor to send for, and talk to, him on the folly of his fears

I have enquired but have not discovered that the recent proceedings at Lahore in the case of the Maharancee have caused any sensation among the troops ; the Governor and some of the officers who have mentioned it seem to approve of it

*28th August.*—Transacted business with the Governor ; we were engaged some hours this morning

Orders have arrived from the Durbar to purchase horses for the Artillery and camels to complete the establishment of regiments of Infantry

I have received 8,000 rupees from the Resident, Lahore, compensation for the unfortunates who were plundered by Sirdar Sher Singh and his people ; it has caused quite a sensation, and will redound much to our credit.

GEO ST P. LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G.-G., N.-W. F.*

No 31 — Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor-General, North West Frontier at Peshawur from Sunday, the 5th, to Saturday, the 11th September 1847

5th September 1847 — A sepoy of the Khas Pultun laboring under sickness for a considerable time destroyed himself by cutting his throat with his *tulwar* last night

Much lightning, wind, and a little rain during the night brought the thermometer down five degrees, it is still cloudy and threatening a good fall of rain would bring on the cold weather

6th September — The Governor called with all the officers. He brought a purwannah from the Durbar in the matter of the Rance being separated from the Maharajah, also one directing the planting and protection of trees throughout the Province.

This morning I inspected all the troops Regular and Irregular, on their respective parades the Aukhalee Cavalry Regiment being very slovenly and dirty in dress and appointments, I ordered them to parade for inspection on the 8th instant

A petition unsigned against Maun Singh Colonel of the Poor beah Regiment (Dhokul Singh's) accusing the Colonel of taking money from the men, I have handed over to the General to investigate the Colonel denies of course, but admits that formerly money was taken but declares none since my arrival

7th September — Transacted business with the Governor which consisted chiefly in hearing and approving what he has been doing for the last two days. He reports the confinement, for leaving his guard and being intoxicated of a Subadar, son of Colonel Meer Jung Ali, the father is a most respectable old soldier 25 years ago a Havildar in our 10th Native Infantry, the son a sad scamp, a court of enquiry has been ordered on him

I have discharged my Treasurer on strong suspicion of changing the rupees and selling a piece of *kinkhab* supplying its place with one of inferior quality. There is a *butta* or percentage of two annas on all rupees coined before '84 which has existed since Avitabile's time on examining the Treasury I find out of 9000 rupees only 2,000 are *butta* less;

the shroffs make much money by this I tried to stop it but failed signally.

*8th September 1847*—The Governor called after receiving the reports of the army, brought the officers with him and sat two or three hours chatting with me.

I inspected at sunrise the Aukhalee Cavalry Regiment mounted, and passed them in review ; one squadron, the left, both in this regiment and the Khals, are mounted on mares. which causes much unsteadiness in the ranks, the cattle are good but wild and require much drill, which they will get next month

Lieutenant Lumsden writes on the 6th instant "I am happy to say I have by riding about the *ragher* villages with the Guides, and making them think we were going to blow them out of the world, arranged matters, though money comes slowly in. I have now settled a fixed rate for each village, which includes the Khans' and Mulliks' allowances, these gentry have done themselves considerably, but they had all fair warning and were told distinctly that nothing will be allowed to be collected beyond what is in black and white, Khader Khan's Tappas are now finished" He adds "I send back Sultan Mahomed Khan's sowars as I can do without them"

*9th September*—Last evening I had the Aukhalee Cavalry dismounted, and after minutely inspecting them, put them through three or four simple manœuvres, the Colonel carrying out my orders in French. The men seemed amused, and I have little doubt would learn kindly, they require weeding, there being many old and infirm men still in their ranks

This morning with the General I inspected 250 rank and file of the several corps They are called reeruits, but all are more or less men who had served in different regiments They marched and fired well by Divisions, Grand Divisions, file firing, etc I expressed my entire satisfaction and ordered them to join the ranks One musket exploded, slightly injuring three men, whom I sent to Mr Thompson for medical aid

We then with most of the Colonels went down the mens' lines, directing various pools of water to be filled up and certain houses to be levelled, etc

In the evening we inspected the 1st Ramgole Regiment, and discharged a few men, unfits who had escaped at previous inspections

10th September 1847 — Last evening a messenger I had sent to summon the Mulliks of the village of Sheikh Mahmdee returned with an answer that they would not attend. The village is distant four *koss*, is a large straggling place notoriously turbulent. With the Governor I arranged that Colonel Ruttun Singh with his regiment of Infantry and the Aukhalee Cavalry should march at midnight and *chapaw* it, they did so and have just brought in the Mulliks (11) with some stands of arms. The surprise was complete, and the result most successful. The Colonel brought a certificate from the chief inhabitants that no injury had been done them.

The Colonel of the Cavalry pleaded inability to accompany his corps from sickness, which, as I saw him quite well in the morning, must have been sudden and requires investigation. He is a great opium-eater.

I held my weekly Durhar of Urbahs yesterday, at which were read and discussed the proclamations from Lahore received during the week. The Governor was present. I was asked if the people might attend the festival of the *Eed i Ramzan* on the 12th with their arms as had been customary. I recommended them not for fear of accidents.

11th September — At an assembly of nearly 2000 men yesterday in the great mosque of the city after prayers the chief Mullah proclaimed 'I have for years prayed that justice might be administered in this Province my prayers have at length been heard you have now justice may you long keep and prove worthy of it.' A shout of 'Amen' made the old walls ring again.

A large Kafilah from Cabool arrived this morning by the river route. The merchants represent the road to Jellalahad as infested by Mahomed Shah Khan's Ghilzies and consequently impassable to small parties. One of the merchants brought an English sword to me for sale, which, though badly worn, immediately recognised as my own, changing from me on the day of the murder of the Envoy.

Five men have just been brought in, wounded yes on all rupees mosque while at prayer the three men who attacked the on examining today  
re bullet less

I had the Subadar, Colonel Meer Jung Ali's son, up, read him a proper lecture on his evil habits and the ruin they would bring down on him, disgrace to his family, etc, and said that, at the General's request, this time he was let off

All is well; the country is one sheet of most luxuriant cultivation.

GEO ST P LAWRENCE, MAJOR,  
Principal Asst to the Agent, G-G, N.-W F.

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No 32 — Political Diary of Major George St P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 12th, to Saturday, the 18th September 1847.

12th September 1847 — This being the festival of the *Ead-i-Ramzan* I have excused the Mahomedan troops duty, and there will be no Grand Parade to-morrow

On Saturday evening with the Governor I inspected the 2nd Regiment of Ramgoles, from which we only selected four units, we also passed in review the *Zamboor* camels attached to the Ghorechurras which have picked up but little in condition I told Sirdar Kabn Singh that, if in another month they were not fit for service, I should send them to Lahore

13th September — A purwanna arrived from the Durbar, dated four months back, promoting a Subadar to Adjutant by seniority So says the purwanna, the Colonel, Ruttun Sing, says he is not the senior, though a reduced Adjutant, and that there is no vacancy in his corps. I have suspended the promotion pending a reference to the Resident

This reminds me that I ought long since to have brought to notice the subject of promotion in the Sikh service, which requires being looked to, as at present the old system still prevails I daresay it has not escaped the Resident and will be rectified in due course, and I know it is his wish that no promotions should take place till the half pay or reduced list is absorbed, but I do not think he is aware that still they are being made, or that there are some men who have been acting in the superior grades and have been so for more than a year, and only receiving the pay of the lower grade When I asked why, the reply was the *pulla* or commission had not arrived

In some corps there are two Commandants, two and three Adjutants, while in others only one of each some troops of Horse Artillery have two Adjutants while others one I am aware that all this may have been caused by the great reduction of troops and wish to provide for different officers still till these are absorbed all promotion should cease.\*

I attended the fair held annually at this season at which were collected from 15,000 to 20 000 people, men and boys, no women, the Barukzye Sirdars and all the Sikh officers were present, their followers the only ones armed. Sirdar Peer Mahomed said he had never seen so quiet and orderly a concourse, the only amusement appeared to be feats in horsemanship firing at marks and taking up tent pegs I had a Resallah and company of Regulars on the ground to keep the peace but their services I am happy to say were not required

The Police took up a man accused of an old murder, and one pick pocket. The European Ramsay I was obliged to send off the field he was intoxicated and kept riding in among the people knocking and pushing them about I have requested the General to keep him in confinement till further orders

14th September 1847—Another fair was held this day about four hours off it is said to have been more numerously attended than yesterday a, but all went off well the Police and a Resallah Company kept the ground.

Lieutenant Lumsden writes on the 13th "I find my *chapaw* has done much good and has sent back nearly all the runaways to their villages besides bringing me a deputation from Loonkhore to know when and where I will be pleased to receive their revenue. I replied that I am not in the habit of treating with villagers but that the Mulliks will be received if they come to me alone. The Mullik of Babeen (a village on the Swat border which has paid no revenue for the last six years) made his salam to me yesterday and brought the amount of his *kist* in his hand which speaks well for the row created "

Intelligence from Cabul to the 8th instant contains little of interest beyond the fact which if true, is an extraordinary one That on the 2nd the Ameer received a letter from Syed Mahomed Khan

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\*Note—The subject of adjustment to rank, pay and promotion is a difficult one and has long had my serious attention.

Pugmaunee, *alias* Jan Fishan Khan, saying that the British troops would shortly be at Jellalabad and call for sundry persons, who if sent, it would be well, if not the Ameer must look to himself and family "

Rumor was rife that Yar Mahomed of Herat had received three wounds, supposed to be in action with the Huzarabs, and that the Persians had taken Herat

Nawab Jubbar Khan had had an epileptic fit and meditated a trip to Mecca, as did Meer Hafiz Jee, the son of the late Meer Waiez.

I have entertained as Treasurer, Pokhur Dass, Shikarporie, formerly Treasurer to the late Sir A. Burnes, C B., pending the arrival of a man for whom I have written to India

*15th September 1847*—Transacted business with the Governor and received the nuzzurs of all the Urbobs and gentry on the festival of *Ead-1-Ramzan*

Zukurrea Khan, third son of Sirdar Sultan Mahomed, with 100 horse, returned from Eusufzye, their services not being required, the young Sirdar is a fine, handsome, soldier-like looking man, not unlike his cousin, the late Mahomed Akber.

Lieutenant Lumsden writes me on the 14th " That the Mulliks of Nowdeh and Kulloo, who escaped him in his late *chapaw*, but whose wives and children he had secured, had given themselves up and would start under charge of my Chupper Bashee to-day for Peshawur and that he had little doubt such was the effect of his night visit but that the Gundghur refugees would either be given up or forced to take flight "

*16th September.*—Though the Urbobs were all with me yesterday they attended the weekly Durbar this morning, we discussed the flourishing state of the crops and the quiet which prevailed throughout the Province, passing mutual compliments The cotton crop is said to be a failure, indeed I have myself seen it is so

The Governor after receiving the reports brought all the officers to salam; they sat for a couple of hours with me.

The Adjutant of Ram Sabai Singh's regiment's period of suspension from rank and pay having expired was brought before us, suitably admonished and directed to return to his duty, the Colonel asked that he might be removed to another regiment, but both the General and I declined



At the General's and several of the other officers' request I consented to pardon Ramsay, he was sent for, admonished and released. He says if he is found again intoxicated, we may blow him from a gun. I fear he is incorrigible.

17th September 1847.—I rode this morning to the Cabul River, nine koss, to settle a dispute about water, involving a loss of revenue to the amount of 12 000 or 14 000 rupees. The rice crop in the neighbourhood for want of irrigation is nearly destroyed. My decision will, I trust, save it. There is no end to these disputes about water. I mounted at 4 A.M. and, though I rode as fast as the nature of the ground admitted, did not return till half past 10. Every village—and I passed many—turned out to see me, the Mulliks bringing money and sheep, both of which I declined. All were most respectful and orderly. The country is an ugly one for troops to act in, from the high walls round the villages and the deep and numerous water courses.

A news-letter from Cabul of the 4th instant reports that Maharajah Golah Singh had proposed an alliance with the Ameer, and that he should attack Peshawur while the Maharajah did the same by Lahore. That the Ameer had rejected it at once. Messengers are said to be constantly passing between them.

The Resident's notification to the army of the establishment of a Pension and Invalid list, with the grant of pension to the families of soldiers killed in action, has given great satisfaction. I have already been applied to by some to know if they may avail themselves of it, the Governor even smiling said he had only two years to complete 40 of service.

GEO ST P LAWRENCE MAJOR,  
*Principal Asst to the Agent G G, N.-W F*

No. 33—Political Diary of Major George St. P. Lawrence  
Principal Assistant to the Agent to the Governor  
General, North West Frontier, at Peshawur, from  
Sunday, the 19th, to Saturday the 25th September  
1847

19th September 1847—Sunday

20th September.—Inspected the troops, Regular and Irregular, the Ghorechurras now form line well. All appeared in good order. The General with the officers waited on me. After parade, I

mentioned to him in their presence that I had heard it was supposed he did not approve of officers visiting me, he declared it was not true, and that he would announce again that all were at liberty to call when they pleased.

The Durbar and Barukzye Sirdars have for months been at issue about a debt of 30,000 rupees, the former claiming and latter denying. A purwanna yesterday to the Governor arrived directing their jagheers to be confiscated till payment be made. I have written the Sirdars recommending their settling the demands.

I had fixed upon moving into camp this morning, but at the Governor's request have postponed it till the 24th. I take Colonel Mehtab Singh's Regiment (Sikhs) and two guns with 75 leave-of-absence men of the Khas Regiment of Cavalry. It is still very hot during the day, but I am anxious to settle the affairs of the Eusufzyes if possible.

*21st September 1847* — Transacted business with the Governor; he wishes me to send Lieutenant Lumsden to assist him in my absence. I have told him, better first try how he gets on alone.

Rode out five *koss* towards Pubbee to settle another dispute about water, between the *Ijarahdar* of Khalsa and the Durbar news-writer, the latter has evidently been getting three times the quantity his village is entitled to.

*22nd September* — Engaged most of the day with the Governor laying down rules, etc, for his guidance.

Called on all the officers to show by their conduct during my absence that they were sensible of the advantages they derived from the present order of things.

*23rd September* — All the Urbobs called to-day and we had much conversation on the state of the country. They represent it in every way to be greatly improved and attribute it all to British interference: oppression has ceased, property is respected, the strong kept in subjection, and weak protected.

It being reported that Kumurooddeen Khan, repeatedly noticed in my Diaries, had with a party of 50 or 60 armed men proceeded last night

to attack one of his own relations and had forcibly released a man seized in an attempt at robbery I had him and his nephew, his Nazir and one or two of his men immediately put into confinement and his premises searched. 60 horses were brought to me, all said to belong to him. It appears that on his dismissal from the "Protection of the road" he did not dismiss his armed retainers but kept them with what view may be imagined. As he is a debtor to the State in some thousands I ordered all his horses fit for the service to be made over to the Artillery, on valuation by a Committee, and enquiry to be made into the accusation against him. He avowedly has only the means of bare support, and therefore his keeping up such an establishment can be for no good.

A report has prevailed in the city for some days of town duties and inland customs being abolished at Lahore to the great joy of the people, and not a little to their relief many have enquired when Peshawur will be equally favored. I replied doubtless soon.

*24th September 1847*—Starting the Sikh Regiment with guns and Cavalry at 4 A.M. under Colonel Mehtab Singh Moraria for Pubbee, I followed in the evening with a small escort. The Governor and most of the officers were with me to the last moment expressing much regret at even my temporary departure. Riding through the city, it appeared more like a fair. It was so thronged all saluted most respectfully and many blessed me praying for my speedy return.

I reached camp at Pubbee by 7 P.M. distance 8 *koss* or 12 miles. Road good, and country well cultivated, the village is a petty one of about 100 houses, half way crossed the Barrah river which just now is not above a foot deep.

*25th September*—It rained a little during the night, but not sufficient to prevent the march of the troops at 4 A.M. I followed at 7 reaching Nowshera at 9 distance about 7 *koss* the whole over an extensive grass plain which was completely under water at the great inundation of the Attock in 1840 and has been improved by it.

My camp is on the bank of the Nagoman or Cabul river, which is here about 250 yards wide with a bank of about 20 feet. The town is on the left bank, merely a bazar, and the fort a small square with four bastions, being on this side. The flood swept away several villages and a great part of the town, destroying many people.

In the fort is a garrison of 35 Ramgoles, it is a place of no strength, save against horsemen; has no stores, but a few maunds of powder and lead.

I am crossing my guns and cavalry to-day, as there are only two boats at this ferry, so as not to delay the march to-morrow I purpose halting and letting all the rest pass over during the day

GEO. ST. P. LAWRENCE, MAJOR,  
*Principal Asst. to the Agent, G.-G, N.-W F.*

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**No. 34.—Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 26th September, to Saturday, the 2nd October 1847.**

*26th September 1847* —Received from John Lawrence, Esquire, new customs regulations, and abolishing all petty taxes and reducing those retained, fixing the collections to be made at certain points the relief thus afforded to the poor will be immense, not only in the abolition of the customs, but in thus stopping the extortion and oppression of collectors, which in many cases exceeded the legitimate tax.

Naib Mahomed Sheeef, our pensioner, the friend of the late Sir A Burnes, who is the contractor of Nowshera, followed me here and has been most useful in procuring supplies, etc.

All the camp have crossed the river; I follow in the evening

*27th September* —March at 6 A.M., reaching Touroo in Eusufzye at half past 8, distance about 12 miles A mile from Nowshera crossed a small kotul or pass over a low crest of hills (the field of battle which decided the fate of Peshawur), from which the road descended into a vast plain of rich alluvial soil but uncultivated, said to be from the difficulty of procuring water thence for four miles road good to the village of Barraah Bunde, situated to the right on a gentle rise surrounded by rich cultivation, which continued more or less to camp; twice crossed the river Culpanee, a broad and deep bed but not dry, it is the boundary of Hushtnuggur and Eusufzye. Here I found Khader Khan of Touroo The road thence runs along the bank on which are several Persian wheels, and the ground is highly cultivated, the crop of bajra and cotton luxuriant

In the evening It was reported that some horsemen from Pullee had shortly after we passed carried off a Hindoo from close to Nowshera, these are the robbers who hitherto secure in their fastnesses live by plundering the country

Many Khans called on me and presented horses sheep and rice the former I returned, but sent the latter to be distributed by Colonel Mehtab Singh to the troops.

Lieutenant Lumaden joined me by appointment, leaving Colonel Holmes force in camp at Kaloo Khan distant only eight miles, with an open country between us, so that we can quickly unite if necessary

*28th September 1847* — Last evening and this morning we rode four or five *koss* to view the country, passing though the village of Hotee and Mychal, its features are much the same as already described parts being highly cultivated and others very much the greater quite barren, though all good soil and water to be had for the digging

Heard from Lieutenant Taylor from Huzarah he hopes to be with me in a few days marches by Torbela and Oond many of his people are sick and it is not to be wondered at, for the heat in the day is great and cold at night equally so At sunrise the thermometer in my tent stands at 60 at midday at 94

Issued a proclamation calling on all the people who had fled to the neighbouring hills to return within a month on pain of forfeiture of land and rights and telling them that an equitable settlement of revenue to include all demands, Government or their Khan's, was about to be made.

Heard from Sirdar Golab Singh the Cazeer and heads of Police all going on well at Peshawur have directed daily reports to be sent me.

*29th September* — Rode last evening and this morning to several villages and stuck up our proclamation in the mosques, we were accompanied by Colonels Mehtab Singh and Purtab Singh, commanding the Ghorechurras

The Khans are troubled and appear to think their reign at an end.

Heard last night that the robbers of Pullee had driven off a herd of cattle killing one man and wounding three, at a short distance from Nowshera. Wrote to Sirdar Syed Mahomed to cause 50 sowars

to patrol from Hushtnuggur to Nowshera and that I should make him answerable for the safety of the roads within his jagheer.

Ursulla Khan of Zedah called to report his arrival from India I lectured him on his not paying his respects at Lahore and told him he might expect to be ordered there, he has evidently a high sense of his own importance which must be lessened ere long He is shrewd and intelligent and professes great devotion to us He presented four horses I returned all, but on his entreating me and urging that he would be lowered in the eyes of his people, I retained one.

*30th September 1847.*—Great rejoicing at Peshawur and all around on the promulgation of the new customs rules and abolition of the mass of petty taxes, which, though yielding little to the State, were productive of much oppression and extortion

This wise and truly politic measure will redound much to our credit Its fame and beneficial results will extend through Turkistan to the gates of Moscow and will next to annihilate the trade of Cabul, as hitherto from the heavy duties in the Punjaub the Lohanee merchants have had it all to themselves, they taking the Bikaner and Bhawalpore route through Dera Ismail Khan and Guznee to Cabul, which occupied three months, whereas now 40 days will do it, and Peshawur instead of receiving its piece-goods from Cabul will send them there.

Rode about as usual morning and evening Comparatively few petitions are presented, kept back I doubt not by the Khan.

The other day some Sikh sepoy's reclining near a well under trees were heard to express their wonder "how it was that not a Singh had been murdered this time since they entered the Eusufzye country, whereas on all other occasions not a day passed but several were destroyed, "it must be," said they, "that the people are afraid of these two white faces." They then discussed the separation of the Ranee from the young Rajah and wondered "whether we meant to play him fair" One replied, "rely upon it they do; they always are true to their engagements" "ah but," said the other, "the bait is great; can they withstand it!"

*1st October*—Took our usual ride; a few more petitions have come in, but chiefly from distant Tuppas.

Lieutenant Lumsden's Guides inform him that the Pullee plunderers have a picket several miles in advance of their position to give

notice of our approach so that they may have time to fly they are very suspicious of all strangers approaching, while one of his men was with them, an old woman gave the alarm that she had seen the Feringhies *en route* to Pullee, which caused an instant rush to the hills. The Chief on the return of the foraging party highly approved of their success in bringing the cattle, but reprobated the spilling of blood. "You will have those Sahibs on us" he said, "If you murder"

Heard from Lieutenant Taylor that consequent upon having obtained the sanction of the Resident, he purposed joining Maharajah Golab Singh's troops in an expedition against the Suddhoons, which he supposed would delay his joining me for six weeks or two months. Wrote him in reply that as I should proceed to Lahore about the end of the month it was necessary he should be with me ere then to arrange his duties. Lieutenant Lumsden being required for some months in Eusufzye to carry out our settlement, his services would be needed to visit the districts and occasionally to run into Peshawur to keep all straight

*2nd October 1847*—Colonel Alla Singh, the Governor's son joined us from Peshawur yesterday though I had recommended his father keeping him to assist in his government during my absence the old gentleman says he can do without him and that his post is with us

Took our ride as usual. We seldom meet a dozen people in as many miles the country seems quite deserted an unearthly stillness prevailing, only broken by the squeaking and creaking of the Persian wheels which are at work night and day

General Elabee Buksh, commanding Artillery sent me a set of horse appointments 180 sets of which have arrived from Lahore a more disgraceful turnout I never saw they are made by contract and evidently will not last three months. I made up 100 sets at Peshawur for much less money, and in every way superior

Geo St P LAWRENCE, MAJOR,  
*Principal Asst to the Agent G.-G., N W F*

CAMP Touroo EUSUFZYE

*2nd October 1847*

**No. 35.—Political Diary of Major George St P Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 3rd, to Saturday, the 9th October 1847.**

*3rd October 1847* —Sunday

*4th October.*—Had a grand parade of the troops, after which sent them to make a promenade through the neighbouring villages, etc.

A letter from the Mulliks of Loonkhore they say their country produces little or nothing and is unable to pay revenue; this is in reply to my summons for them to wait on me

Sent orders to Colonel Holmes to march to-morrow to Sawul Dhur, near Jumal Ghurry, to which I purposed moving at the same time had not we found in the evening that another day at Touroo was necessary to complete its settlement

Lieutenant Lumsden seized a spy from Pullee, who acknowledged that he had been deputed to watch our proceedings. He had driven off 20 bullocks three months before, and was pointed out by the owner. On being questioned he coolly acknowledged the fact, saying he had given them up on receiving 25 rupees, which sum he was now prepared to refund. He seemed to deem it hard measure his being put into confinement for such a mere matter of trade!

*5th October* —With Colonels Mehtab Singh, Alla Singh and other officers, accompanied by 20 or 30 of the men, we went out hog-hunting; the sépoys were most eager, and appeared to enjoy the sport highly

Colonel Holmes reports that finding scarcity of water at Sawul Dhur, he fell back on Hamzah Ghur, a mile in its right rear.

*6th October* —Marched to Jumal Ghurry, 12 miles, for the first four to the village of Mahoba partial cultivation, from thence over a barren plain passing the small village of Cazeabad, round which were a few patches cultivated. There is no road but a foot-path, the country however is so flat that the guns had no difficulty in moving.

Jumal Ghurry is a small village, with only three wells in or near it, water very scarce and little or no cultivation. Opposite to our camp on the spur of a hill "called Brahma" are the remains of an ancient stronghold, which we visited and in which we found many beautifully carved figures in stone, most more or less defaced. The natives could give us no information connected with the place; an adjoining hill is called "Gungah."



7th October 1847—Marched to Cutlung, which is just in rear of the hill called Brabma, and over which is a narrow foot path. The gun road winds round the spur and then up a narrow gorge (easily defensible) for two or three miles, where it opens into this valley which is bleak and barren

This village consists of three divisions on as many mounds with a sort of basin below and separating them through which runs a stream at present nearly dry. It seems a wretched place, producing little or nothing

The Mulliks of Cutlung and Loonkhore waited on us and professed their willingness to pay what they could but that it was little they had and most of the villages near the hills they said would not pay at all. Two named Shamoozye and Bahoozye, distant only three kos, priding themselves on having foiled Sirdar Sher Singh's attack and inflicting considerable loss on the Sikhs, would not hear of even paying their respects. I have written to their Mulliks advising their coming in and talking to us

Colonel Holmes' force joined at Cutlung this morning, so that we now muster 6 Horse Artillery guns, a regiment of Cavalry 64 Ghore churras, 40 jagheer horse, two regiments of Infantry and four companies of Ramgoles exclusive of the Guide Corps

Posted the pickets myself a double chain, foot and horse

8th October—We reconnoitred this morning the village of Shamoozye. Found the people on the alert, with flags flying and occupying the most commanding positions, it is in a cleft of the hills their sides protected by them the front is defended by a breastwork said to be of wood. Unless we can crown the heights I fear we shall lose many lives

Received a reply to my letters both the villages profess submission, but declare they are too poor to pay revenue. I have again written them 'to send me their headmen to talk to me when I had no doubt we would easily arrange matters that till they come in I could do nothing to ease them of their burdens.'

In the evening with a few horse we rode to the village of———, which we found nearly deserted. came on all their flocks and herds, which as we did not plunder I am led to hope will show the people that

they have not the old Sikhs under Sirdar Sher Singh to deal with. This valley being entirely dependent on rain for irrigation and little having fallen this year, there is hardly a particle of vegetation.

9th October 1847 — Reconnoitred this morning the village of Baboozye; found all prepared to give us a warm reception. Three shots were fired at us, which, until the men who fired are given up, will preclude our making any terms with the people. The village is situated much as Shamoozye in the cleft of the hill, but seems more open in the rear. I annex a field sketch of the two taken by Lieutenant Lumsden.

Hearing that there was a foot-path from the opposite or Suddoom side of the hill, we sent a Guide yesterday to reconnoitre it, and I am happy to say that he reports it accessible to the very top; once there, a few men can command the village and its defences. We send a party to-night, under the pretext of looking for cattle of the Baboozye people said to have been sent across the hill, and on Monday morning we expect to be enabled to give a good account of these warlike gentlemen.

The Mulliks of Shamoozye have just come in and paid their respects, the first time they say they ever did to any one. We commended them accordingly, and sent them back apparently well pleased; they were greatly alarmed at first, fancying we should seize and imprison them. I gave them no Khillut or money, deeming it a bad practice thus to pay rebels.

Intelligence from Cabul up to the 25th ultimo of no sort of interest.

GEO. ST. P. LAWRENCE, MAJOR,  
*Principal Asst. to the Agent, G-G., N-W. F.*

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**No 36.—Political Diary of Major George St P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 10th, to Saturday, the 16th October 1847.**

10th October 1847 — The Guide Company with a company of Ramgoles marched last night for the Suddoom valley with orders to ascend the hill above Baboozye, so as to reach the summit by daybreak and descend as soon as they see the main force in position.

Towards evening received a message from Fatty Khan, the Duffadar of Guides, who leads the party reporting arrival at Suddoom.

and his having commenced searching for the cattle of the insurgents as a blind Meer Baba had assembled his men ready to co-operate

Struck our camp and placed all the baggage in a defensible position, telling off a resallah and three companies for its protection

At a meeting of Commanding Officers in my tent explained to each the plan of operations for to morrow, so that if possible there may be no mistake. Told them to warn their men against plundering or leaving the ranks on any pretext and to take no camp followers but water-carriers all seem most eager and anxious to please.

*11th October 1847* —The force marched at 2 A.M., consisting of 6 Horse Artillery guns 470 Sabres Khas Dragoons and Ghorechurras 972 rank and file Sikh Regiment Nujeebs and Ramgoles all in high spirits

The action commenced by the enemy on the left spur attacking our right skirmishers the guns were quickly brought to bear on the heights and village, but did not succeed in clearing either. The skirmishers were then ordered to force the spur under cover of a water course, but mistaking the order they made a rush up the face which was perpendicular here they were brought up and took shelter as best they could. Seeing their critical position I withdrew them but not till they had sustained some loss. Rallying them under shelter of some trees I detached their support to carry out the original order

The skirmishers of the left column took up an excellent position within musket range of the village and I supported them by posting the main body under Colonel Holmes on a rocky mound commanding its left defences

My chief object was to engage the attention of the enemy from our rear attack, without exposing my men, and in this I succeeded though much against their inclination several of the Colonels coming up to me at different times and begging me to give the order for a general assault.

At length on seeing the head of our rear attack debouching from the hill I gave the much desired order which was promptly obeyed. The enemy fled in all directions and the village was in our possession

Our loss is trifling — 1 killed and 13 wounded Mr Thompson was in the field and most useful

The troops throughout the day behaved admirably, not an attempt was made to plunder or leave the ranks till I gave the order to fire the village, when I told them to help themselves.

*12th October 1847* — As the troops were collecting yesterday to return to camp after the destruction of the village, Lieutenant Lumsden observed at the distance of some miles, among the brushwood, the Pullee Cavalry robbers instantly giving chase with 24 of his Guides and some Khas Dragoons, after a gallop of six miles he came up with them, but only just as they entered the village, into which he did not think it prudent to follow them; another mile more and he would have given a good account of them. He reports that the Dragoons were soon left in the rear

Lieutenant Taylor joined me yesterday shortly after our return to camp, having made a forced march of 30 miles in hopes of being in time for the action; his disappointment was great at finding it over

The Mulliks of several *yaghee* villages have tendered obeisance, many who never were known to do so before, the fate of Baboozye has opened their eyes.

*13th October* — Marched this morning to Leekpanee, about five miles in advance toward Pullee, the force under Colonel Holmes proceeding direct; Lieutenants Lumsden, Taylor and myself, with Colonels Kahn Singh, Rosa, and Alla Singh and two resallahs of Dragoons proceeding by the village of Loonkhore, which gives name to the district

I had intended to pitch my camp there, but from the nullah being dry and water only procurable from wells, changed my mind

Loonkhore is a large populous village, contains about 1,500 houses, 100 of which are Hindoos, who carry on an extensive trade with Swat, it is surrounded by a deep and broad ravine and if defended could only be taken with much loss, from the Cutlung side it might be cannonaded with effect

We rode through most of the streets attended by the Mulliks, the women crowding the tops of the houses and the men the doorways to see us, the latter giving us the "welcome of peace"

The country is bleak and barren, not a blade of vegetation did we see in our whole ride

A deputation from Baboozye, a Syed and Hindoo, to know if they would be forgiven "Certainly" I replied, "on the Mulliks attending, which they might do without the slightest fear"

*14th October 1847*—I am happy to say our wounded are doing well. I have given up my hill tent to them and we all visit them daily. Mr Thompson is unremitting in his attention to them the poor fellows seem most sensible of all this and thankful, contrasting it with what would have been their fate had they not had the Sahiban with them!

Rode towards Pullee this morning, but thinking we saw their sowars, spread out to intercept them and so taken out of our course visited the village of Kobee. Instead received most graciously most of them were out against us on the 11th!

Wrote to the Mulliks of Pullee to come in give up the Hindoo their horsemen had seized at Nowshera, and the man who had committed the murder in that quarter, otherwise they must stand the consequences

*15th October*—Reconnoitred Pullee. In approaching it met a measeoger with a reply to my letter it was not to the purpose, so we sent him back telling him to caution the Mullik against any shot being fired at us

On nearing the village we found all ready to receive us warmly but it is a place of no strength being quite in the open they might possibly give us a volley or two and then would take to the hills

The Governor of Peshawur writes me that he had a salute fired to announce our victory and alarm the evil disposed. He wants to send me reinforcements but I have declined them

*16th October*—Lieutenant Taylor and I rode to the village of Kurekee to examine some ancient remains similar to those I saw at Jumal Ghurry. Lieutenant Lumsden going towards Baboozye to make a sketch of the valley

Mecr Baba of Suddoom, our good ally, brought in 200 head of cattle he had seized belonging to the villages of Shamoozye and

Baboozye; these we restored to them to-day to their amazement and our credit.

I hear daily from Peshawur from the Governor, Cazee, Police Officers, etc, and all, I rejoice to say, appears to go on well

GEO ST P. LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G.-G, N.-W F*

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**No. 37.—Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 24th, to Saturday, the 30th October 1847.**

*24th October 1847.*—Crossed the guns and Infantry over the river yesterday and the Cavalry during the night, had six boats, two from Khesgy, one from Akhora and two from Nowshera all got over well

Marched to Pubbee by the old or King's road The crops are nearly ripe and look promising

A deputation from the Governor waited on me with a *zeafut*, etc

*25th October* —Marched from Pubbee at daybreak, near Chum-kunnee we were met by the Governor, Sirdar Golab Singh, Sirdars Sultan Mahomed and Peer Mahomed Khan, General Elahee Bukhsh and others, who accompanied us through the city to the Agency. The troops were drawn up in line, extending from the Cabul Gate to the left of the Ali Murdan Cantonment, and looked clean and well appointed A salute of nine guns was fired on our passing the Governor's residence and one of 11 guns on reaching the parade

The officers, Urbobs, etc, on alighting were introduced to Lieutenant Taylor, and then presented the Dusserah *nuzzurs* to me, the amount I lodged in the Peshawur Treasury.

The city was all alive and the tops of the houses crowded to see us pass.

I am happy to say only two or three petitions were presented during the day, which shows a decided improvement in the state of affairs.

*26th October.*—Commenced the issue of two months' pay to the Khas Dragoons returned from service in Eusufzye

Transacted business with the Governor in revenue matters Lieutenant Taylor present to see how matters were carried on

Visited the regimental parades. Two companies of Colonel Meer Jung Ali's corps were practising Light Infantry movements

Likewise with Lieutenant Taylor visited the fort, magazines etc. the late Commandant with the officers in charge of stores are in confinement on the grave charge of embezzling Government property it has been going on for years

27th October 1847—Sirdar Kaho Singh with all his officers of Ghorechurras waited on me with their Dusserah *nussurs* which I made over to the Peshawur Treasury

With Lieutenant Taylor visited the Wuzereeh Bagh found Sirdar Sultan Mahomed and family occupying the house. We were received most graciously and sat some time with him. He has made quite a show place of it

The Havildar of Nujechs recently promoted by me and who was severely wounded at Baboorye died to-day. The rest of the wounded are in my hospital doing well

I have many complaints against the new ferry toll collectors

28th October—Transacted business with the Governor and afterwards held my weekly durbār of Urbabs to all of whom I introduced Lieutenant Taylor. They are full of congratulations on my late operations in Loonkhore.

The Governor came to me this evening in rather a perturbed state with a purwāna from the Durbar to hold a regiment of Cavalry, three of Infantry and a troop of Horse Artillery in readiness to march *vid* Kohat to Bunoo Tank. Also an order for the Barukzye Sirdars with 2000 horse and foot to accompany the force. I have issued orders accordingly though the force of Infantry thus taken from this is somewhat large, seeing that there is already one corps with Lieutenant Lumsden in Eusufzye and another may be required in that quarter

29th October—Took Lieutenant Taylor this morning to pay the Governor a visit. We met the several officers civil and military, in durbār and sat upwards of an hour

Intelligence from Cabul up to the 21st instant is that on the 1st Sirdar Mahomed Akiam Khan had applied to his father from Huzara for reinforcements, as 20,000 men were collected against him and he was hard pressed. The Amceer in reply told him to hold his own, he should be quickly aided, parties were daily proceeding from Cabul and Kohistan to reinforce him.

On the 6th instant a merchant of Cashmere and Bokhara told Nuwab Jubbar Khan that a large Russian force had arrived within eight marches (*munsel*) of Khiva at a place called Aka Musjid.

Mahomed Shah Khan, Ghilzie, was still in rebellion against the Amceer, and it was said that the British at Peshawur had written him in terms of approval and encouragement.

A purwannah from the Durbar has reached the Governor for the execution of the sepoy in Meek Jung Ali's regiment who murdered a prostitute. I have directed it to be carried into effect on Monday next, in the mode customary in the Sikh service, which is to march the prisoner round the cantonments and then execute him.

30th October 1847 — Lieutenant Taylor transacted business with the Governor in my presence and heard all the reports of the army and city. He likewise investigated the daily cases, petitions, etc., and will continue to do so.

The troops returned from Eusufzye with Colonel Holmes have received their pay for two months, and will receive two more with the rest of the force on arrival of the treasure.

A large kafila has just arrived from Cabul by the river or Tartarra route and I am told has brought much property belonging to our unfortunate army.

I regret to say fever is prevalent just now among the troops and small-pox is raging in the city.

Another prostitute has been cut down by a sepoy, a Mussalman in Colonel Dewa Singh's Sikh regiment. He is in custody.

I purpose starting for Lahore on the 4th proximo, having made all arrangements for carrying on the duties here.

GEO ST P LAWRENCE, MAJOR,  
Principal Asst to the Agent, G-G, N.-W. F.



No 38.—Political Diaries of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor General, North West Frontier, at Peshawur, and Lt. R. G. Taylor, Assistant to the Resident, from Sunday, the 31st October, to Saturday, the 6th of November 1847

*31st October 1847*—Sunday

*1st November*—Inspected the troops at Grand Parade after which with Lieutenant Taylor saw Colonel Ruttun Singh put his Regiment of Sikhs through a few manœuvres which were creditably executed

With the Governor we then inspected 112 hullocks reported unfit for further service by the Commandant of the Artillery 56 of these had just arrived from Huzara to a batch of 300 directed all to be sold on account of Government.

Lieutenant Taylor transacted business with the Governor in my presence

The sepoy of Meer Jug Ali's Regiment found guilty of the murder of a prostitute was executed this morning in the manner customary in the Sikh army that is he was marched through the city and cantonments under charge of the police and a company from Ruttun Singh's Regiment and then hung At least 10 000 people attended, among whom were crowds of women who highly applauded this prompt justice.

*2nd November*—With Lieutenant Taylor I took a long walk into the country, passing several villages we had only two attendants The people saluted us in the most cordial manner and seemed much gratified at our thus going among them

The crops with the exception of cotton are most flourishing ploughing and sowing are going on in good style.

Lieutenant Taylor heard the reports of the troops and transacted business with the Governor who is taking to him famously

A camel load of medical stores arrived this morning from the Umballa Depot for the use of the Agency just in time as our medicines were getting scarce

*3rd November*—Lieutenant Taylor transacted business with the Governor and received the reports of the city, troops, etc

All the officers waited on me this morning to take leave, most had some petitions to make regarding their decrease of pay, reduction in rank, etc. I listened to all and gave them soft words in reply.

There being several non-commissioned vacancies in Colonel Soobhan Khan's and Maun Singh's Regiments, I had the seniors of each grade up and selected the most efficient for promotion.

We rode to the Cavalry Parade this morning to see the Brigade exercise under Colonel Kahn Singh, Rosa handled them fairly.

*4th November 1847* — Major Lawrence left for Lahore before daylight, a salute of guns was fired on the occasion. I rode a short distance on the Hushnuggui road on returning to the house I found the Sindar awaiting me, transacted business with him.

The Urbobs of the various Tuppas came according to custom to present themselves, Thursday being their day for audience.

*5th November* — The regiments paraded on their respective parade grounds.

I rode to the village of Chittee Dheree in the Khulleel Tuppah, about five miles to the south-west of Ah Muidan Bagh. At the village of Paokah on the road to Chittee Dheree, I found the fields filled with cotton-pickers. This crop did not appear to me to have suffered so much in the neighbourhood of this village as it has in other places. I examined some pods and asked one of the pickers whether they ought to be larger than they were. He said no, that they were not usually much larger.

The Indian corn crops are very luxuriant, on one occasion I addressed some words of admiration of them to one of a group of zumeendars near Chittee Dheree. He in reply commenced in the usual querulous tone that prayers for reduction of assessment are made in saying that the crop was spoilt and the country ruined (*sic*). I was so taken by surprise that I laughed in his face and was joined much to his chagrin by his companions and friends, who seemed to be aware that there was little hope of making any one believe the assertion of the desponding spokesman.

At Chittee Dheree I ascended to the roof of Zereen Khan Urbob's house and from thence obtained a good view of the surrounding country, the village of Tukul and forts of Bara and Jumrood.

I omitted to mention that I yesterday presided at the distribution of 670 rupees to the inhabitants of the Dhobees mohullah in the city being a portion of an unjust fine extorted from them in Sirdar Outar Singh's time. A man was found hanging in their mohullah, having it is supposed committed suicide, but no clue being found as to the supposed murderers between 7 and 800 rupees were exacted as a fine from the whole mohullah. Of this sum only 670 rupees found its way to the Government *Pelte*, and to the restoration of that sum Major Lawrence obtained the sanction of the Durbar. The people seemed thoroughly to appreciate this piece of retrospective justice. I explained to them that 670 rupees was the amount received by Government on the occasion and that that was all they would receive again. They replied that they would be glad to take whatever was allowed.

Transacted business with the Sirdar after breakfast.

Mahomed Ameer Khao Khulleel requested leave to take Ursulla Khan of Zedah who is under orders to remain at Peshawur to his house for the purpose of giving him an entertainment. I consented to his being absent two days, telling the former that he would be answerable for his appearance if wanted in the interim.

6th November 1847—Rode to some of the Mohmund villages beyond Banamoree. The whole of the southern suburbs of the city are still well wooded and many of the old gardens remain but to the west, north and east a clean sweep has been made of them.

In the evening the Sirdar brought the officers of Artillery and I wrote down their names.

Ramdass Dufteree presented a number of *Tunkhwahs* for signature. I had heard that Major Lawrence had directed Gunput Rae Treasurer to present all *Tunkhwahs* so I told Ramdass to make them over to him.

The Sirdar requested that the usual Monday parade might be excused on account of the *Dewallee* also that the sums allowed by regulations for the purchase of oil etc. for illuminations, might be sanctioned namely 5 rupees for each regular regiment of Cavalry or Infantry and 2½ rupees for every troop of Artillery. To both of these propositions after enquiry, I gave my consent.

REYNELL G TAYLOR LIEUT,  
Assistant to Resident

No. 39 — Political Diary of Lieutenant R. G. Taylor, Assistant to the Resident, Lahore, at Peshawur, from Sunday, the 7th, to Saturday, the 13th November 1847

7th November 1847 — This being the *Dewallee* I was overwhelmed with offerings of sweetmeats, fruit, etc. The town and lines were brilliantly illuminated in the evening and the Sirdar caused the tank and canal in this garden to be decorated with rows of lamps. I observed that the houses of the Mussulman officers were as brilliantly lighted up as any.

8th November — I had excused the regular Monday parade of the whole force on account of the ablution necessary after the *Dewallee*.

An European of the name of Patrick O'Leary surrendered himself to me as a deserter from the 3rd Company, 6th Battalion of Artillery. I placed him under surveillance. He has since been seriously ill. He states that he left Loodhianah on or about the 20th October.

The Barukzye Sirdars came to visit me. I showed them the specimens of coal which Mr Sub-Assistant Surgeon Thompson had procured from Kohat and its neighbourhood. On seeing the specimens they said that there were quantities of it in that part of the country.

9th November — The regiments paraded on their respective grounds. The Governor came in the morning.

10th November — Rode round the city in the morning; saw a number of people collected at a spot, a short distance from the Yakka Toot Gate and heard afterwards that smoke had commenced issuing from the ground at that place. Found the Sirdar awaiting my return.

In the course of the day he sent me a number of pui wannahs that he had received from the Duibar on the subject of the debts of Sirdars Sultan Mahomed Khan and Syud Mahomed Khan to Government, the former owing 10,000 rupees and the latter 14,000, for money borrowed. The Duibar has several times directed that portions of their jagheers should be resumed until the debts be paid. I referred to the office and found that Major Lawrence had, a short time ago, written strongly on the subject to the Sirdars, so I forwarded copies of his letters with letters of my own to them recommending them to settle the debts in question with as little delay as possible. Sirdar Sultan Mahomed Khan replied that he had repaid 4,000 of his 10,000

and that Major Lawrence had said that on reaching Lahore he would try and make some arrangement to relieve him from the payment of the other 6 000 I have written to Major Lawrence to enquire into the truth of this statement. From Syud Mahomed Khan I have as yet received no answer He, I am told undertook to pay in two months and the time has elapsed. Unless he makes some satisfactory arrangement I shall send for him and insist on his doing so I hear he disputes the full extent of the claim

With regard to Sirdar Sultan Mahomed Khan I think it hardly fair to press him and talk of confiscating his jageer, when he with a force of 2 000 men is under summons for service

*11th November 1847*—The regiments paraded on their respective grounds I visited the Infantry and Artillery parades, found Colonel Rutton Singh manœuvring a brigade of three regiments, namely his own (Seikhs) Colonel Maun Singhs (Poorbeahs) and Meer Jung Ali's (Mussulmans) He handled them very creditably, but all the movements were rather slowly performed

I then passed on to Colonel Holmes' Regiments, one of which Subhan Khan's Mussulman Regiment, I found distributed in squads and practising the English Manual and Platoon

Went to the spot where the smoke is said to issue from the ground. There was none visible, but putting my hand into the crevice I found the heat very great.

*12th November*—Rode to the Momund villages of Lundee and Bahadoor the former the residence of Mahomed Khan, Urboh, who is building a new house in it

The whole of the country about these villages is beautifully cultivated

Rupees 2 12,000 having arrived from Lahore in specie, Hoondies and Tunkhwahs, for the payment of the troops the rupees amounting to one lakh and six thousand were this day counted and placed in the Treasury

The late Superintendent of the Fort who is in irons on a charge of peculation being reported by Mr Thompson as seriously ill of dysentery, I consented to his irons being removed for a few days, Durbarah Singh Ijarahdar being security for his not attempting to escape.

13th November 1817.—Rode through the Fort of Jumrood, the distance is called 7 *koss*, but I should not reckon it above ten miles. It lies west by south from Peshawur and is about two miles and a half from the upper or northernmost entrance of the Khyber Pass. The Fort has, I fancy, been previously described; it is now undergoing repairs, and the miserable hovels and holes in which the garrison formerly lived are being replaced by well-built rows of lines, the roofs of which form a convenient platform rather lower than the barbette of the defences. There are only three guns in the Fort.

On my way to the Fort I found no men at all in two of the Chokees on the road and only seven men in a third. The care of this road is entrusted to the Khulleel Uibobs who enjoy considerable jageers for the purpose. I found out that it was properly Zereen Khan of Chittee Dherce, who should have provided them to-day and that on the line which I passed there ought to have been upwards of thirty men. On returning to Peshawur I sent for Zereen Khan and made him over to the Sirdar, with directions to fine him 500 rupees, this I afterwards reduced to 100 on the Uibobs solemnly promising that such an impropriety should not again occur, and if it did that his jageer should be held forfeited.

Found the Sirdar awaiting my return with a large budget of purwannahs from the Dubai, one of which directed that no rupees of a date prior to Sumbat '88 were to be received in revenue. The general remark on this was that there would not be found enough good new coin in the country to make up the amount of Government revenue. The immense quantity of defective and old coin is a great evil in this province.

I have released Nujuf Khan, Khuttuck, for a few days on the security of Sirdar Peer Mahomed Khan, Baiukzye, to enable him to make arrangements for the payment of his debts to Government. If he fails to accomplish anything he will be again confined.

REYNELL G. TAYLOR, LIEUT.,  
*Assistant to Resident*

No 40 —Political Diary of Lieutenant R. G Taylor, Assistant to the Resident, Lahore, at Peshawur, from Sunday, the 14th, to Saturday, the 20th November 1847

*14th November 1847* —Rode into the town to see the site of a robbery that had taken place. The Jemadar's guard at the Cabulee Gate turned out only three men to present arms. The orders are distinct that until one watch of the day every man of the guard is to remain present. The Jemadar did not even know where his men were, this is the second instance of laxity that I have met with in the guards furnished by the Ramgoles. I gave the first man, a Jemadar 20 days' extra duty on the same guard, the second, also a Jemadar. I ordered to be reduced to the rank of Havildar.

*15th November* —General parade in the morning. I inspected the troops. After parade I inspected the troop of Horse Artillery under orders for service in Bunnoo. The guns, men and horses appeared in good order. the harness is all new.

*16th November* —According to appointment the Barukzye Sirdars came in the morning with the Governor to consult on the route of the troops to Bunnoo *via* Kohat. My letter of the above date has put you in possession of the information gained on the occasion.

*17th November* —The Sirdar came in the morning. I rather astounded him with the information that I had received orders to accompany the troops to Bunnoo and he immediately proposed sending for Lieutenant Lumsden.

The regiments about to leave this are being paid before the others and they are also receiving their new clothing, which arrived from Lahore a few days ago.

The camels properly belonging to the troops have not arrived, and it will be necessary to take those which have brought the clothing.

Ramdass, Dufteree, brought a long list of complaints on the subject of the treatment the Kardars are said to be receiving at the hands of zemindars and Mullicks. these accounts may be true or not, but the object is chiefly to show how our system of extending favour and protection to the zemindars renders them insolent and unruly. I shall enquire

carefully into the cases and punish if I see reason and shall especially warn the Uzbobs that if such improprieties are frequent it will be visited on them

Ahyaudeen, Badshah, came to show a letter from Mahomed Shah Khan, Ghulzie, enquiring what officer had arrived at Peshawur and what force he had brought with him.

*18th November 1847* —The Sudai came in the morning and stayed during the whole day superintending the distribution of clothing to the men

Mirza Muzhui Allee, Commandant of Artillery, told off for duty in Bunnoo, made some difficulty about the preparation of fuzes. He is said to know little about his duty in that way

It being the day for the Uzbobs of the various Tuppahs to present themselves, I had directed the Kardars to be present also, and then in their presence told the Uzbobs plainly that if the theft of grain and violence to their servants complained of by the Kardars continued, they would be made answerable for it. I have caused the Mullicks of two villages to be called in, and in one case where they had allowed the cotton crops to be destroyed by cattle have put them in confinement

A cold-blooded murder has occurred, committed by a man who found his niece sleeping with a servant, he was accompanied by the father of the girl, and the uncle at first said that he had himself strangled her and that the father did not participate, he has since declared in my presence that the father held one end of the cloth and he the other. The father has escaped, but the uncle was apprehended on the spot. I have ordered the culprit to be executed on Monday. I think in such a case I should be wrong to delay punishment. Had the murder been committed with a sword the man would have deserved death, but considering the state of society and the prejudices of his religion, I should have felt some compunction in ordering his execution, but his savagely following the girl into an inner room and there strangling her with a cloth makes his crime heavy, and Major Lawrence having proclaimed that blood must atone for blood, it seems to me just that when an individual has taken upon himself the office of executioner for an offence committed against himself, he should pay the penalty to the power in whom the right is really vested.



Prompt punishment seems more especially necessary in this province where human life is so little regarded and scarcely a day passes without serious cases of wound being brought in.

19th November 1847 — The Bunnoo troops moved to the plain on the further side of the Wuzereeh Bagh.

Lieutenant Bowle arrived early in the morning.

It appearing to me that Mirza Muzhur Allee the Commandant of Artillery ordered to Bunnoo was a difficult man to deal with and not by any means intelligent, I ordered him to remain here and have put Lahooah Singh, Commandant in command of the troop. Muzhur Allee made difficulties about preparing fuzes, etc., and I found it very difficult to get a direct answer from him. In case of any serious work I should have had no confidence in his intelligence, they say he is otherwise a good soldier.

Chest Singh Colonel of the Akal Regiment of Horse marches with them. His promotion to the above rank has been for some time sanctioned by the Durbar but has been in abeyance on account of his sickness. The Sirdar referred to me to know whether he should be enrolled in the Daftar as a Colonel to which I gave my assent.

The Sirdar came in the evening to visit Lieutenant Bowle and brought General Elahie Buksh with the Artillery officers to pay their respects to him.

The Sirdar sent me a number of purwannahs received from Lahore for perusal. The orders on the subject of the *Meerbahree* are still obscure. In the agreement written by the contractors five rivers are mentioned namely the Ravee, Chenab, Jelum, Attock and Lundai, while in the purwannah accompanying it only the four first rivers are mentioned and those taking passage-money on any smaller rivers are threatened with penalties. A former purwannah said from the Beas to the Attock. The *Meerbahree* is not taken on the Lundai, at present, Major Lawrence having forbidden it.

This was the first day of the *Eed ul-Kurban* and a salute of guns was fired with my sanction on the occasion, such having always been the custom.

20th November 1847—The Bunnoo troops marched to Budber, where they halt to-morrow, Sirdar Sultan Mahomed Khan having reported that one day's more work would improve the Kohat Pass, and that if the force halted at the foot of the Pass they would be pressed for water.

This being the second day of the *Ead*, a fair was held near the Fort. Everything went off quietly and when I rode to it at about four o'clock, the people were all returning.

REYNELL G TAYLOR, LIEUT.,  
Assistant to Resident.

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No. 41.—Political Diary of Lieutenant H. B. Lumsden, Assistant to the Resident, Lahore, at Peshawur, from Sunday, the 21st, to Saturday, the 27th November 1847.

21st November 1847—No business transacted.

22nd November—Occupied all day in making arrangements preparatory to my departure for Peshawur.

I have ordered the Detachment of Ghorechurras on duty with my camp to accompany me to Peshawur, having no further need for their services and finding it inconvenient to provide forage for so many horses.

23rd November—Leaving my camp standing at Ismaila, at 5 A.M., I rode in to Peshawur, arriving about 11, just in time to see Lieutenant Taylor before he started to join the Bunnoo force, accompanied by Yehya Khan, son of Sirdar Sultan Mahomed Khan.

24th November.—Visited the Artillery parade grounds and saw General Elahee Buksh manœuvre a troop of Horse Artillery in a very business-like style. On our way home Lieutenant Bowie and I took a look at the preparations making in the Gor Khuttree for casting the new Horse Artillery guns ordered to be cast here: the work is progressing, though it will be some days before the casting can take place.

25th November.—I forgot to mention that Colonel Ameer Khan's Regiment of Nujeebs received their pay yesterday. Three troops of Artillery have also been paid to-day.

Rode through the town, accompanied by Lieutenant Bowie, and found all the police at their posts and everything orderly and clean.

The usual Durbar for the Urhobs was held during the forenoon. Many of them complained that the zemindars refuse to pay what is justly due to them. I have told them to prove a clear case against any one and the delinquent shall be punished but that if a case of extortion is proved against an Urbob he shall likewise have his deserts.

*26th November 1847*—The company of Colonel Mehtab Singh's Regiment on duty with the Governor and three troops of Dragoons were paid in the morning.

I have ordered the company of Nujeebs on duty with my camp in Eusufzye to be relieved by a Ramgole company the relief to take charge of the pay for Colonel Mehtab Singh's Regiment and a Dufstree to accompany and disburse the pay.

Lieutenant Bowie and I also paid a visit to the wounded men now in hospital. I am happy to say the poor fellows are doing as well as could be expected. They appeared pleased at my taking notice of them.

*27th November*—Rain commenced to fall during the night and has continued all day, much to the delight of the zemindars.

I intimated to the Sirdar my intention of returning to Eusufzye on Monday morning, a move which the old gentleman does not at all advise but there is nothing here which he cannot do well for the present, whereas the new arrangements in Eusufzye require watching to prevent the Khans from playing tricks.

H B LUMSDEN LIEUT,  
*Assistant Resident*

No 42.—Political Diary of Lieutenant H. B. Lumsden, Assistant to the Resident, Lahore, on duty in Eusufzye from Monday, the 29th November, to Sunday, the 5th December 1847

*29th November 1847*—Rain greater part of the morning. Towards morning I visited the Sirdar and started for Ismailla, arriving in camp about sunset. After a day's rain the road between Peshawur and Nowshera is impassable for camels or hackeries and very bad for horses.

30th November 1847.—Issued the proclamations from the Durbar regarding the consideration to be shown to men bringing waste lands under cultivation.

Sindar Sultan Mahomed has removed the sowars posted for the protection of the public road and has taken them with him to Kohat

1st December.—Have not been able to go out for three days owing to a constant fall of rain.

A murder was perpetrated this morning by a man in Zedah, who suspecting his wife of infidelity watched her movements for some days and at last caught her intriguing with a neighbour he bound the man to a *charpai* and running after the woman cut her down with a *tulwar*, returning shortly afterwards and cutting the man's throat. It appears a rule among these Pathans that in these cases a man must first kill the woman before it is considered lawful to finish the adulterer. The murderer is in confinement

2nd December — The news-writer in Peshawur reports that the shroffs in the city decline to bring forward their cash for receiving (*sic*) till they have advice from Lahore and Umritsur of the rates charged there, the mint charges here being 10 per cent. I have written to Major Lawrence on the subject All appears to be going on smoothly in Peshawur under the Sirdar's able management, though the old gentleman is rather diffident of his own powers

The Mulicks of Khubbul have sent a Vakeel with Bahnam Khan of Zedah requesting me to grant them an interview, which I at once agreed to My camp being here has kept these gents in a state of fear till they are tired

3rd December.—I have ordered each Moaffedar holding a rent-free well to plant a *tallee* tree near it, on pain of the resumption of his grant, hoping in this way to gain a supply of timber without loss to Government or the ryots, as they all plant trees of some sort to shade the cattle working the well and may as well plant a useful sort of timber.

4th December.—Pay arrived this morning from Peshawur for the Detachment on duty with me and was disbursed to the Artillery and Sowars The Muzbee Company being relieved at the same time returned to the capital

All the Khans attended my Durbar according to custom, but have nothing to communicate besides the usual cry for an increase of their stipends

This part of the country is all quiet and the people busy with the barvest and getting the *harce* crop in the ground

5th December 1847—This being Sunday no business was transacted beyond hearing petitions

H B LUMSDEN LIEUT,  
Assistant Resident

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No 43 —Political Diary of Lieutenant R G Taylor, Assistant to the Resident, Lahore, at Peshawur, from Wednesday the 15th, to Saturday, the 18th December 1847

15th December 1847 —Rode into Peshawur from Kohat, distance 40 miles, great preparations made for our passage through the Durrah, which on account of the Khyherries having come down in great numbers to the foot of the hills is now anything but safe. We, however, received no molestation but a man was killed a short time after we had passed through. The inhabitants of the villages of Alhoor Zeroon Khail and others in this Durrah which is the only portal to Kohat are independent, pay no revenue and receive an allowance from the possessors of Kohat for free passage. I reached Peshawur at about 4½ o'clock. The Sirdar came the same evening

16th December —Sirdar came in the morning some muskets, ammunition and gun metal arrived from Lahore

Sirdar Golab Singh has received charge of the whole of the rivers Attock and Lunda in the matter of *Meerbalree*. He has occupied the ferries on the latter river 10 in number by placing Lallah Salamat Rae with two writers under him at Nowshera, and a sergeant and sepoy at each ferry to collect the tolls and render account every four days to the Lallah who will at the end of 15 days render account to the Sirdar

He has entrusted the ferry at Attock to the *Aicnee* Moonshee who was placed there to prevent people crossing to the Punjab without *ralidarces*, and he is to have a couple of sepoy to help him. For the ferries above Attock amounting to four, the arrangement is similar to that

made for the Lundai, a writer being placed at Oondh with orders to report to the man at Attock, while for the ferries below Attock down to the boundaries of Mooltan, he proposes to send a company of Infantry under an intelligent officer to post the writers and people at the various ferries and establish the custom by the imposing presence of Government troops. All these arrangements I have agreed to as the best that could be made under the circumstances; no one is willing as yet to undertake the contract, and the great thing is by a careful arrangement to obtain some correct estimate of the probable produce of each ferry.

17th December 1847 — Sirdar came in the morning, bringing a number of papers with him. The first case produced referred to the camels of the *Zumboor Khanah*. It appears that some time back the Durbar called for an account of the number of camels that had died in the *Zumboor Khanah*. Jye Singh, the Commandant, and his Moonshee sent in an account of 50. On this report being received by the Durbar an order was issued directing all the *Zumboorchees* who had lost their camels to be dismissed and then *Zumboors* to be sent into store. On the Sirdar proceeding to carry this into effect, it appeared that not above 16 camels were actually required to complete the number and therefore that it would only be necessary to dismiss that number of men. I do not understand this matter yet. It appears, however, that when the *Zumboor Khanah* was in Lahore there were in it 86 camels for the *Zumboors* and 12 for the Magazine, while the actual number of *Zumboors* was only 52, that out of this total of 98 camels 50 have actually died, leaving 48 for duty, 12 of which belong to the Magazine, and 36 to the *Zumboors*, which would leave 16 dismounted. It did not, however, appear to me that it was according to regulations to have extra camels in the *Zumboor Khanah*, and the explanations given were not satisfactory, and I am inclined to think that the 34 extra camels at one time existing in the *Zumboor Khanah* were weak and disabled ones whose places had been supplied though still kept on the rolls, and that they have now been put in to fill up and save men from dismissal. I shall enquire into this and report the result to you.

18th December — Colonel Kullan Singh (*sic*) brought the Durbar *pui wannah* in the case of Mirza Muzhui Allee, Commandant of Artillery, by the wording of which it would appear that it had been reported that the Commandant had raised difficulties with the object of getting

off the duty of accompanying the force, which was far from the case, and I believe his being relieved was in itself a great punishment to the man, who is reported to be an excellent soldier, though not a very brilliant Artillery man

The Sirdar requested to know what arrangement was to be made to prevent disturbances in burying the *taseahs*. A purwannah had been previously received from the Durbar forbidding the cries of "Dum i-chuhar yar" and 'Dum i punjtun,' the watchwords of dissension. I enquired what had been the arrangements in Avitabile's time and found that no *taseahs* were allowed in the city and if parties carried standards on horses from one house to another they were not allowed to do so openly in the streets. The Mussulmans of the regiments were allowed to carry about and bring *taseahs* outside the town, accompanied by a company of Infantry. I directed that these old rules should be strictly adhered to and caused proclamation to be made to that effect, and everything has since passed off well and without the slightest disturbance.

Mirza Hussein Ailee brought Shere Alee Khan Kazulbash who has just arrived from Cabul driven thence according to his own account, by the persecutions of the Ameer consequent on a letter addressed to him from Jan Fisban Khan having been found on the person of a *kassid* who died at Jellalabad, in which he told Shere Alee Khan that the English were certainly coming to Cabul and to be ready to join them. Major Lawrence has, I believe, already investigated this matter and ascertained that Jan Fisban Khan was not the writer of the letter in question. Shere Alee Khan presented a nuzzur which I did not receive, and dismissed him with slight notice.

REYNELL G TAYLOR, LIEUT

*Assistant to Resident.*

No 44.—Political Diary of Lieutenant R. G Taylor, Assistant to the Resident, Lahore at Peshawur from the 19th to the 25th of December 1847

19th December 1847—I heard from Lieutenant Edwardes from Bunnoo

One Abul Kasim son of Shab Abbas brother of Sbah Sboojah, came to pay his respects, he had just arrived from Cabul having been

driven out of that country, he states, by the persecutions of the Ameer Dost Mahomed Khan

Obtained a clue to the detection of the parties concerned in the great robbery in the city and sent off the Thanadar with a party of his men to apprehend them

20th December 1847 — The Sirdar came in the morning bringing a number of pui wannahs, one to the effect that the Mussulmans were not to be hindered in calling the *Asan*, another directing the speedy sale of salt by parties who have the article on hand, a third ordering Dhara Singh's quota of horse to be sent to Lahore, a fourth mentioning that Major Napier had been appointed Superintendent of Public Works in the Punjab, a fifth ordering the Khurreef payments to be realised from the Kaidars by the end of the present month of *Poh*

Received intelligence from the thief-taking party to the effect that they had secured one of the robbers, who had confessed and implicated another man, a resident in the Doabah. I immediately wrote to Sirdar Sultan Mahomed Khan directing his apprehension

General parade, which we attended.

Two men, camp-followers of the Khoolah Fauj, were murdered near the village of Dullozye by the Afreedees, who carried off the camels they were tending. I have summoned the Mulicks of the three neighbouring villages to institute an enquiry into the matter

21st December — The Naib, Mahomed Shereef Khan, who has been ill for some time, died in the course of the night; he received a pension from our Government of 400 rupees per mensem which lapses. He has left three sons — one, the eldest, Rudur Khan, is about 29 years of age. Naib Shereef, as he was commonly called, was sincerely attached to our interests and his death deprives the British Government of a well-wisher in these parts

22nd December — The Sirdar came in the morning

I inspected Colonel Jye Singh's *Zumboor Khanah*. I have before alluded to this case. The Durbar called upon him or Sirdar Kanh Singh for an account of the number of camels that had died in the *Zumboor Khanah*. Jye Singh and his Moonshee sent in a statement showing that fifty had died, in answer to which an order came



directing that all the dismounted men were to be dismissed and their *samboors* put into the Fort proceeding to carry this into execution the Sirdar found that there were only 12 men actually dismounted. It then appeared on enquiry that Jye Singh had had at one time as many as 34 extra camels that 50 had actually died, but that he still retained 34 of sorts. This I found to be the case on inspection, but considered 6 of them that had just been put in to fill up as totally unfit for work some of them being scarce able to stagger under the weight of the *samboorahs* and therefore directed them to be made over to the magazine and the riders whose own camels had died some time before to be dismissed also a man whose camel has died within the last ten days as the order appears to me to be prospective. In the case of two men who were bad characters but had not lost their camels, I directed them to be dismissed and retained two men of good character and of very long standing. These men are most of them about five months in arrears, but as the Government demands from them the price of the necklaces and *brooches* given by Jowahir Singh and Heerah Singh, they are many of them brought in debtors on the whole account. Jye Singh was justified in saying that 50 of his camels had died, not in saying that he required that number to fill up he might fairly have indented for 25.

Sirdar Sultan Mahomed Khan sent in the second thief who at first denied all knowledge of the matter but has since confessed property to the amount of 16 000 rupees was stolen. It remains to be seen what will be recovered. The townspeople and others seem as much pleased as I am at the discovery of the robbers, which was scarcely to be hoped for.

23rd December 1847 — Lieutenant Lumsden came in from Khuttuck. The Urbobs of the Tuppahs came to pay their respects. In the course of conversation they said that a money settlement would be a great blessing to the country and save much ill feeling and strife.

24th December — Nothing of importance occurred. Lieutenant Robinson of the Huzara Survey came in from Shamshabad.

25th December — It being Christmas Day, the Sirdar sent a large *assafut* of sweetmeats. The parades were excused for the same reason.

REYNELL G TAYLOR LIEUT

*Assistant to Resident*

**No 45 —Political Diary of Lieutenant R. G Taylor, Assistant to the Resident, Lahore, at Peshawur, from Sunday, the 26th December 1847, to Saturday, the 1st of January 1848**

*26th December 1847* —Went with Lieutenant Robinson to the Gor Khuttree to visit the Sirdar, saw the preparations making for casting two guns. The process is simple but ingenious. the first step in the arrangement is the formation of a mud model of the future gun on a round stick or pole. This mould is beautifully shaped and rounded and made exactly the requisite form and size. On this again the mud composition of the mould is laid to a thickness of about half a foot; this is allowed to dry and the stick in the centre of the model is then withdrawn and the model immediately crumbles to pieces inside the mould, the latter is then hardened by fire to the consistency of brick, and into this the metal is run, a round bar of iron covered with a coating of the composition being first suspended in the centre of the mould to form the bore. Thus the whole gun, trunnions and all, is run off at once and turned out of the mould nearly fit for use

- Lieutenant Lumsden left for Khuttuck.

I received a book of English Duil translated into Hindustani, which I made over to the Sirdar

*27th December* —Sudar Kanh Singh came with the 19 men of the *Zumboor Khanah*, who have been dismissed. I heard all their accounts in their presence. I ordered that those to whom money was due from the Government should be paid up and that those (the majority) who were brought in debtors to Government, albeit in a year or four months, should make any petition they wished on their arrival at Lahore, they have been mulcted for the *boodkess* and *kunthas* issued in Heerah Singh's and Jowahn Singh's time

Quazee Gholam Kader came from Sirdar Sultan Mahomed Khan to represent the case of the village of Addozye, the inhabitants of which, having written an agreement before Major Lawrence to pay their revenue for the future, to forfeit 400 rupees for every murder committed within their limits and to refrain from injuring the neighbouring village of Muttunee by cutting off its water, have violated these three compacts and are now in an unmanageable state, affording no

hope of the Khurreef revenue being realised from them. The object of the Quazee's mission was to beg for the assistance of some Government troops to help to coerce the village the idea being that the very name of the Government troops accompanying the force would be sufficient to bring them to reason. I told him the matter should be taken into consideration. Addozye is so far in a rebellious state that its neighbourhood is not safe for our ryots.

*28th December 1847* — Accompanied Lieutenant Bowie in the morning to inspect Tarah Singh's and Futteh Khan's troops of Horse Artillery, the horses are for the most part in good condition but the hullocks are miserably thin and some so small and decrepit as to be utterly useless. There are also one or two horses in each troop totally unfit for further service. I have requested Lieutenant Bowie to pick out those horses and hullocks which he deems useless when I will inspect and report upon them with a view to their immediate sale. The loss to Government by the amount of useless cattle at present feeding at its expense must be very great.

Sirdars Golah Singh, Sultan Mahomed Khan and Peer Mahomed Khan came in the evening. Sirdar Sultan Mahomed Khan's visit referred chiefly to his debt of 6,000 rupees to Government, which in consideration of the expenses he had been put to, he hoped he might be allowed to pay on the collection of the Rubbee crop. I told him that I would write to you on the subject.

I am enquiring into the rights of the case with regard to the division of jageer and service between the three brothers and will report the result.

*29th December* — Mirza Muzhur Allee took his leave. I gave him a note to Major Lawrence.

I heard the case of the Killadar of Jumrood Jowallah Sahare and confirmed the Sirdar's previous decision, he having fined the Killadar 120 rupees for the general negligence of his garrison on the occasion of Lieutenant Bowie's visiting the Fort a short time ago.

I wrote to Major Lawrence on the subject of the village of Addozye before mentioned.

*30th December* — Received a letter from Major G. Lawrence on the subject of reinforcing the Jumrood Fort and other matters.

Shahzada Allee Ahmed, son of Shah Kamran of Herat, who has been for some time staying with Sirdar Sultan Mahomed Khan, is about to proceed to Kandahar *vid* Shikarpore I gave him a *rahdaree* and a letter to Lieutenant Edwades.

31st December 1847 —The Sirdar came in the morning I told him to send a company of Regulars to Jumrood, which has since been done.

Muza Muzhur Allee left for Lahore

The Sirdar came bringing a number of Government purwannahs

The Sirdar proposed sending two *Zumboors* to each of the forts instead of putting the whole 19 into the fort here I approved.

Sirdar Syud Mahomed Khan came by appointment to consult about the payment of his debts to Government and the real extent of his liabilities for service Out of the 14,000 rupees claimed he solemnly denies the validity of the demand for half the amount, while of the other 7,000 rupees he states he has paid 5,330, and therefore that he has only 1,670 rupees to make good I have called for his receipt for the above sums, which he professes to have in his possession.

1st January 1848 —Received a letter from Lieutenant Lumsden to the effect that he intended sending me in some intelligent Guides.

The Sirdar went out to Hushtnuggur to inspect the Fort

REYNELL G. TAYLOR, LIEUT.,  
*Assistant to Resident.*



*Peshawar Political Diaries, 1848*

*Note* — Major George St P Lawrence, Principal Assistant to the Agent, Governor-General, North-West Frontier at Peshawar, returned from Lahore on the 19th of January 1848, relieving Lieutenant R G Taylor, who was in charge at Peshawar during Major Lawrence's absence

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**No. 1.—Political Diary of Lieutenant R. G. Taylor, Assistant to the Resident, Lahore, at Peshawur, from Sunday, the 2nd, to Saturday, the 8th January 1848.**

*2nd January 1848* —Nothing of importance occurred

*3rd January* —The Sirdar came in the morning. He reported the Doabah Fort, which he had been to visit the day before, to be in good order, and also said that there had sprung up quite a town around and under it, nearly 200 houses of Khuttees having already domesticated themselves there. These new settlers had besought him to give them a town wall to protect them against thieves, who appear to abound in those parts. In case of the settlement being protected by a wall they were of opinion that numbers more of the Hindus of the neighbouring hills would come and settle in the place. The estimated expense of the wall is about 1,100 rupees, and the Sirdar proposed allowing them 500 from Government and letting them make up the rest themselves, to which I agreed, the establishment of such a colony being likely to prove beneficial to the country in every way.

There have been several cases of men being found selling beef lately, and in one a quantity of that treasonable article was found in a butcher's shop in the city. I mean to sanction severe punishment in this case and have not much pity for the parties. They have had full warning; they have been allowed to call their *Azan*, and mutton is at six pice the seer, and yet from mere vice they must go and traffic in the forbidden food and endanger the present universal harmony for no possible advantage to themselves.

*4th January* —Sirdar Syud Mahomed Khan, Barukzye, came to discuss his debts and his quarrel with his brother.

*5th January* —The pay of the Ghorechurras lately received from Lahore is being disbursed. These men do not receive extra batta for being west of the Indus, as the other troops do.

*6th January* —Received a complaint from the Adjutant sent to establish the ferries on the Indus, to the effect that the inhabitants of the village of Jhund, near the Khooshalgurh ferry, declined receiving the Government toll-takers or paying the fares.



Quazee Gholam Kader and a son of Sultan Mohamed Khan came to discuss the point at issue between his father and Syud Mahomed Khan. I shall say nothing about this case at present as I have not yet thoroughly understood it myself. I heard from them that Sirdar Sultan Mahomed's son Ibrahim Khan, who had been detained at Lahore, had now been allowed to join his father who they said, was greatly delighted at the intelligence.

*7th January 1848* - Rode to the city in the morning to see and settle a quarrel about a drain between two householders. It is really quite extraordinary how every little thing is now referred to the European officer, and no man is pleased unless his case is decided by him while his lightest word is as absolute law as ever was Avitahiles during his reign of terror.

Jaffer Khan of Khuttuck came to pay his respects, having been summoned by the Sirdar on account of the recusancy of the dwellers near the Khooshalgurh ferry on his side of the river. He said that the man chiefly in fault was a Mullick of Pindce Ghebee, named Allyar Khan to whom I accordingly addressed a purwannah on the subject. I also wrote to Lieutenant Nicholson begging him to lend any assistance in his power to enforce the Government arrangement.

Heard from Lieutenant Lumsden from Moghul Khel who stated that murders were taking place daily among the Eusufzyes.

The Governor came in the evening.

Mahomed Ameer Khan Urbob of the Khulleel Tuppah came to report that the tanks in the Fort of Jumrood had been filled. These tanks are supplied by water from the Khyber and the Khyberries occasionally cut it off though they receive a handsome allowance yearly for the accommodation. They stopped the water some days ago, and I was obliged to send the Urbob to have it turned on.

*8th January* - Colouel Alla Singh commanding a troop of Horse Artillery son of the Governor, has in the course of three months saved the Government the extraordinary amount of 120 *kanals* of Joar and Mukkee fodder amounting to about 300 rupees, merely by keeping a strict account of the fodder not required for sick and absent horses. Each troop receives a *tunkwah* on the Kardar every 15 days for the full number of horses. By careless troop officers the whole is called in

and the excess caused by sick or absent horses is either wasted or improperly made use of for private purposes. Alla Singh has shown how greatly the Government must suffer in the course of the year by this slovenly arrangement. I now propose establishing a general godown for the whole 15 days' supply of the six troops, the commanders of troops to indent on it for their daily supply for the exact number of horses on feed and whatever may be left to be carried to the next fortnight's account, the supply to be brought in by the hackeries of each troop successively instead of each troop bringing in its own, which causes much wear and tear to the carts and bullocks. This plan was suggested by Lieutenant Bowie. I have given Colonel Alla Singh great credit for his zeal and care in proving how much may be saved by a better arrangement.

The arrangements for the transmission of sepoy's family remittances by orders on the Government *Petee* have given much satisfaction. Could the accommodation be extended to the transmission of the savings of the Poorbeahs and Hindustanis to their families in our Provinces, it would be considered a great boon by them and lay them under obligation to our Government. A Colonel of a regiment at this station has positively no safe means of sending money to his family. On his expressing a hope that eventually we should extend our good offices to the establishment of some system with the above object, I said that I feared it would be difficult as I knew that it was a hard matter to manage for our own army. His reply was "This army and your own are all one now," an unimportant remark, but I think anything that tends quietly to such an amalgamation and the encouragement of a friendly feeling towards us among so large a portion of the members of the army is worthy of adoption, if feasible.

REYNELL G TAYLOR, LIEUT,  
*Assistant to Resident.*

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No 2—Political Diary of Lieutenant R G Taylor, Assistant to the Resident, Lahore, at Peshawur, from Sunday, the 9th, to Saturday, the 15th of January 1848

9th January 1848.—Heard from Major G Lawrence from Jelum

10th January 1848—Rode with Lieutenant Bowie to the Fort to inspect the cells of the life-prisoners and other things, found them tolerably clean, but very confined and ill ventilated.

We then inspected the Magazine, and finding a considerable number of the ammunition boxes open and too full to be closed, while others were only half filled I directed a more equal distribution of the stores and that the boxes should be closed from the outward air at any rate.

The Governor came bringing all the officers of the regiment to pay their respects. I expressed to them my satisfaction with their conduct saying that when Major Lawrence left I thought it not impossible but that some difficulty might occur, but that I was happy to say that through their good conduct and assistance everything had gone well. The Sirdar took the words out of my mouth and rendered them into familiar Goormookhie and the Officers in reply were profuse in their protestations of being thoroughly contented and happy, which I believe to be true.

At the Sirdar's suggestion I issued a circular purwannah to the Urbobs of the Tuppahs, bidding them produce the Kardars receipts for all the revenue of their villages by the end of the month of *Poh*.

Lieutenant Edwardes having written from Bunnoo for some houses of silk spinners I on this day summoned some of the men to see what they thought of the plan. I thought they seemed inclined to go as on account of the scarcity of mulberry trees in these parts there is little chance of their being able to revive the trade quickly here. The eggs of the moth are very scarce at present and must be procured from the neighbourhood of the Sufaid Koh, Cahul or Cashmere. The parties stipulate for an advance to enable them to set themselves up properly at Bunnoo.

11th January—Quazee Gholam Kader brought Sirdar Sultan Mahomed Khan's answer to his brother Syed Mahomed Khan's statements.

12th January—The new Paymaster, Dewan Luchmun Pershad is entering on his duties having taken accounts from Mul Chunc Bakshee Bhuggut Rains brother who has hitherto paid the Peshawur Troops. The result was as follows—The whole balance unaccounted

for appears to be Rs 37,091-4-0 up to the 1st of *Magh*, the present month. Of this Mul Chund says that Rs 28,265-13-0 have been accounted for in Bukshee Bhuggut Ram's accounts up to the end of the month of *Sawun* Rupees 6,222-14-0 he has still by him, being the balance of unclaimed pay for the months of *Bysakh* and *Jeit*, also Rs. 1,324-12-0 on the same account for the months of *Har* and *Sawun*, also, Rs 914-5-0 surplus balance of the amount allowed by Government for the months of *Bhadoon* and *Asoo*, also *Kuserat* of money paid for those months, Rs 363-8-0 Thus Mul Chund holds Rs 8,825-7-0 to be made over to Luchmun Pershad on receiving instructions from his brother, while the remaining Rs 28,265-13-0 he declares has already been accounted for in his brother's accounts. This matter will be easily settled by a reference to Lahore

I inspected 16 Artillery horses and 7 Yaboos and 2 bullocks selected by Lieutenant Bowie from four of the Artillery troops as totally unfit for service, as they certainly were, some were so bad that it was only the knowledge that such a proceeding would be distasteful to the Hindus which prevented me from ordering them to be shot on the spot. These animals were supposed to be receiving 5 seers of grain a day, together with *bhoosah*, servants, and other expenses, and many of them could not have done their part in dragging a gun ten yards. I condemned the whole lot, ordering six of the least bad horses to be used as grass-tattoos and the rest to be sold by auction, which has since been done

13th January 1848—The Governor came with some Government purwannahs one to the effect that the wives and families of fugitive offenders were not to be molested

Lieutenant Bowie proved four of the newly-cast guns with two rounds of 4 lbs of powder each, they stood the test well.

14th January—Rode with Lieutenant Bowie to Sirdar Kahn Singh's lines to see the site of a robbery, thence to the Fort to inspect the Magazine, where we found everything nicely arranged—a great improvement since our last visit

The last *deiah* of the Ghorechurrahs paid to-day.

Sirdar Syed Mahomed Khan has paid me 1,640 rupees, to be forwarded to Bunnoo for his horsemen, at present on duty with Lieutenant Edwardes. Murders and robberies are very frequent in this Sirdar's jageer. I have several times spoken to him about it

Inspected some bullocks of Muzhur Allee's troop and condemned five of them.

*15th January 1848*—I sent my tents out to Lundee, the chief village of the Momund Tuppah. I have for some time received directions from Major Lawrence to commence enquiries into the revenue arrangements of this district, but have been so thoroughly employed here that I have been able to do very little in the matter, and my chief object in moving out is to be ready to commence when Major Lawrence takes up the duties here. I rode out to my tents after breakfast and inspected the ground disputed between Mullick Meeroo and Shaikh Izzut, a case that has cost some trouble and is not settled yet. I spoke to Mahomed Khan, Urbob on the subject of the murders that are so frequently occurring, generally caused by the previous intrigues of the victims, but very often on mere suspicion of their existence and while it was certainly necessary that Government should punish the offenders to protect the lives of others still as long as every man considered himself bound to avenge his own injury by the instant and condign punishment of his enemy, there was little hope of improvement or a stop being put to outrage. I therefore proposed that a jirga of all the influential men of the districts subject to Peshawur should be summoned and that they should fix upon some severe punishment, to be awarded by Government for both parties detected in an intrigue a punishment severe enough to alarm and deter others and satisfy the injured party, or I said let every case of the kind be referred to a jirga in the Tuppah let them fix their own punishment and refer it to Government for confirmation, and let every man understand that the injury inflicted on him would be duly punished, but that any one taking the law into his own hands would be summarily dealt with. Mahomed Khan, who is a sensible man seemed to think the thing feasible and certainly much required. Were this accomplished, similar jirgas might be assembled to settle old blood feuds by fines or otherwise and enable society to start afresh on a new footing which they are not disinclined to do.

REYNELL G TAYLOR, LIEUT,

*Assistant to Resident*

*P S*—I understand that the Sirdars and officers, who are partial to wine are much inconvenienced by the present contract system, which

makes it unlawful for them to have the spirit they require for home consumption made in their own houses and under their own superintendence as was formerly their custom they are now quite in the power of the distillers, who make the spirit very strong and adulterate it with intoxicating drugs. It would be considered a boon could an arrangement be made by which an officer or respectable man might be enabled to distill a certain quantity of liquor in his own house. I should think it might be managed by allowing the contractor to sell licenses for the private preparation of certain quantities, a man of his own attending the operation.

R G T.

CAMP LUNDEE

January 17th, 1848

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**No 3 —Political Diary of Lieutenant R G Taylor, Assistant Resident and Major George St P Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 16th, to Saturday, the 22nd January 1848**

16th January 1848 —Rode into the station to breakfast. The Governor came and told me that he had received a letter from Major Lawrence directing him not to release Nujuf Khan, Khuttuck, as besides his liabilities to Government on account of revenue he was under suspicion of being concerned in a murder case.

Sidar Syed Mahomed Khan has made over to me the sum of Rs 1,639-5-0 to be forwarded to his son, Mahomed Alim Khan, in Bunnoo for his horsemen, at present on duty in that country, and I on this day gave him an order on Lieutenant Edwardes for the amount, to be sent by the hand of his own *cossid*.

17th January —Camp Lundee. Employed all day in hearing cases and making enquiries into the revenue arrangements of this Tuppah.

18th January.—Camp Lundee. Heard in the evening from Major Lawrence to the effect that he intended reaching Peshawur next day; gave orders for his reception accordingly.

REYNELL G. TAYLOR, LIEUT,

*Assistant Resident*

19th January —Marched yesterday from Nowshera into Peshawur being met at the village of Chumkunnee by Messrs Taylor and Bowie,

the Governor, Sirdar Golab Singh, Powindeah, Sirdars Kahn Singh and Soorat Singh of the Ghorechurras Sirdars Sultao Mahomed Khan and Syed Mahomed Khan Barukzyes with all the Urbobs and men of respectability

We passed through the city and out by the Cabullee Gate, from this point to the cantonments of All Murdan Khan the troops Regular and Irregular lined the road and saluted as we passed each regiment

The crowd of spectators was great and I regret to say, in the pressure near the Lahore Gate my elephant trod on a poor man and seriously injured him. I had him removed to our hospital, but I fear with little hopes of saving him

I am happy to say that under Lieutenant Taylor's able arrangements all is peace and content in the city and neighbourhood

*20th January 1848*—Held yesterday a grand Durhar of all the officers civil and military. Nuzzurs were presented but I merely touched them saying that I hoped soon to be able to tell them that the custom of nuzzur giving was abolished

I took this opportunity to express my approbation at the appearance of the troops and of their conduct during my absence, as reported to me by Lieutenant Taylor, more particularly noticing the soldier like bearing and spirit evinced by the force under Colonel John Holmes on their march from this to Bunnoo

*21st January*—Drafts from the Troop drafts of the Horse Artillery recently broken up at Lahore arrived yesterday consisting of 43 men and 29 horses and 10 without horses. On my arrival at Topa Manakialla I found this Detachment making very slow progress, 22 days from the capital. I gave them to understand that if they did not mend their pace and reach Peshawur shortly after myself they would be punished. Their Commandant, Futeh Sing, has not arrived.

Issued four months pay to one *missul* of Ghorechurras in presence of Sirdar Kahn Singh, Majeeta. One *missul* remains unpaid and the whole are still 6½ months in arrears.

The Regular and Ramgole Troops are paid up to 15th October. As yet I have not heard of any assets to meet their arrears having left Lahore this should be seen to.

A shock of earthquake was felt at half-past 8 A M which lasted some seconds a small portion of one of the city gates and the wall of the Fort of Shahmeer Ghur have been thrown down

Last evening at a grand Durbar at the Governor's I presented him and Sirdar Bahadool Kahn Singh, Majeetea, with their dresses of honour, on their attaining the dignity of Bahadoors

Lieutenants Taylor and Bowie accompanied me and we made the ceremony very imposing I availed myself of the opportunity to point out to the officers that good and faithful services such as Golab and Kahn Singh's were not overlooked, be the officers ever so distant from the capital A salute of 11 guns announced to the city the completion of the ceremony, and, as the old Sirdar said, struck terror into the hearts of the evil-disposed

22nd January 1848 — Engaged with the Governor in revenue and military matters I regret to say that nearly Rs 1,20,000 of revenue is still due by contractors to Government I have given them ten days to pay it up under penalty of imprisonment

In several recent purwannahs from the Durbar to Sirdar Golab Singh, I observe that his title of "Bahadoor" is omitted it would be well to enquire whether intentionally so or not

Had a long visit from the Sirdars Sultan Mahomed and Peer Mahomed Khan, complimentary and congratulatory on my return As usual, they were most ardent and eager in their professions of attachment and anxiety to render service to the British

They mentioned that the Ameer Dost Mahomed Khan had not left Cabul, but had sent his son Hyder Khan to Jellalabad

Several *Kafilas* have recently arrived from Cabul by the river route.

GEO ST P. LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G-G, N W F.*

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No 4 — Political Diary of Major George St P Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 23rd, to Saturday, the 29th January 1848

24th January 1848 — There being an annual fair held at Chumkunnee this day, I excused the usual grand parade of the troops



Ordered a resallah and company of Regulars with half the Police force to attend the fair

With Lieutenants Taylor and Bowie and General Elahee Buksh Colonel Alla Singh and other officers visited the fair, at which were assembled at least from 15 to 20 000 people. Met the Governor and Barukzye Sirdars there all went off quietly and well

Lieutenant Bowie under instructions allotted the Artillery drafts and Horses recently arrived.

*25th January 1848*—Transacted business with the Governor in revenue affairs

Commenced taking the muster of the Ghorechurras with a view to pensioning and invaliding unfits

Lieutenant Taylor who came in from the Momund district to meet me returned to his tents to prosecute the settlement of that quarter

Sirdar Peer Mahomed Khan claims a remission of nearly 5 000 rupees revenue on account of loss said to have accrued from the abolition of customs I have directed the matter to be investigated

*26th January*—With Lieutenant Bowie inspected 115 bullocks of the Artillery reported by him unfit for draught. Of these 80 were received in November from the Kardar of Kutchie they are totally unfit for the service and should be sold at the Kardar's loss the rest are old and worn-out. I have ordered them to be sold by auction.

I had to reprimand Colonel Jey Singh's Artillery for not attending the parade.

Lieutenant Bowie reported a Golundaze of Commandant Futteh Khan's Artillery as guilty of gross insubordination towards his officer I investigated the matter on the spot and sentenced the man to receive fifty lashes in front of the whole of the Artillery and then to be dismissed the service.

At a visit Sirdar Syed Mahomed Barukzye, paid me in reference to his contention with his brothers and his difficulties, he said he was quite willing to give up his jagheer to meet his debts. If I would out of it make him an allowance sufficient for his support.

*27th January 1848.*—The Governor was with me for some time on his return from the punishment parade which, at his suggestion, I made a general one

Received instructions from the Resident to depute Lieutenant Taylor to join Lieutenant Edwardes at Bunnoo, there to remain for the next month or six weeks have accordingly written him to come in and proceed with all convenient expedition His absence will considerably retard the contemplated summary settlement of the province.

Lieutenant Lumsden writes from the Hill portion of the Khuttuck district that it is in a disturbed state, the Afieedees plundering at pleasure and the Khuttuckees being too weak to prevent them

*28th January.*—The Governor was with me for some time discussing civil and military matters

As it rained all day I postponed the muster of the Ghorechurras till Monday next

With Lieutenant Bowie I inspected the Magazine in the Fort of Shahmeel Ghur. Notwithstanding due intimation was given to the Storekeeper the previous evening of my intended visit, neither he nor his Moonshee were present. On enquiring I found that contrary to repeated orders they both reside in the city. I have consequently removed them from their situation and ordered them to Lahore The Storekeeper, by name Bhaie Hurdial, it seems was one of the door-keepers of the Maharancee, sent to Peshawur on the reduction of the establishment

Sirdar Peer Mohomed Khan paid me a visit to take leave on his return to Hushitnugger.

I had a visit from Shere Allee Khan, Jewanshere, a Cabul refugee, who is desirous of being pensioned for the services he says he rendered the late Shah Shoojah and the British I told him he might send in his case, but that I was quite sure he had nothing to expect, inasmuch as, in our hour of need, neither he nor any of his clan rendered any service.

*29th January.*—Colonel Ruttun Singh, Maun, attended with the reports of the Army, the Sirdar having caught cold from coming out yesterday.

I find that the Regular Troops effective present do not exceed 4,300 men whereas the quota for Peshawur is 10 000 Exclusive of Ramgoles in the Forts, there are about 1,600 present effective and 850 Ghorechurras I hope the troop of Horse Artillery regiment of Cavalry and three of Infantry detached to Bunnoo will be returned ere long or arrangements made for supplying their place, as it is most desirable that I should have at least 2 000 men available at all times to move at the shortest notice

Intelligence from Cabul up to the 21st, but of no importance

GEO ST P LAWRENCE MAJOR,  
Principal Asst to the Agent G-G N W F

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No 5. -Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor-General, North West Frontier at Peshawur from Sunday the 30th January, to Saturday, the 5th February 1848

30th January 1848 - Heavy rain all yesterday and last night

The Governor, I regret to say continues indisposed Mr Thompson visited him.

I have excused the grand parade for to-morrow in consequence of the state of the weather and ground.

31st January - Colonel Ruttun Singh attended with the reports of the force.

I recommenced the muster of the Ghorechurras the men do not seem to take kindly to the invaliding I fancy they fear there is little certainty in their being regularly paid I have told Sirdar Kahn Singh to disabuse their minds of this impression

The Governor paid me an evening visit and talked of applying in six weeks for leave to visit his home to marry his son young Lena Singh I advised him to depute Colonel Ailsa Singh if it could be done by him he replied he would write and enquire the old gentleman is better, but looks ill.

1st February - Transacted business with the Governor and mustered 3 ~~missals~~ of Ghorechurras

Colonel Dhun Raj of Ramgoles, noted in my Diary of 9th August as having proceeded on leave, afterwards much to my regret sent in his resignation, consequent on the reduction of his allowances having returned and expressed his wish to resume his post, in consideration of his previous good conduct and unblemished character, at a time when all around him were more or less tainted, I have restored him to the command he held with so much credit to himself and satisfaction to those under him

Lieutenant Taylor was to have started for Bunnoo to-day, but from a communication of Sirdar Sultan Mahomed to the effect that the Kohat Pass was unsafe just now, his march is postponed for three days.

By letter from Lieutenant Edwardes we learn of an attempt on his life having ended in the death of the assassin

Lieutenant Lumsden arrived from the Khuttuk hills and fully confirms, I regret to say, his previous account of their disturbed state and of the general poverty of the country; so great is it that supplies for 100 men in many parts were not procurable and had to be brought down the Indus from Attock.

This being a Mahomedan festival there was no business transacted, all the people were out pleasuring

*31d February 1848*—Held my weekly Durbar of the Urbobs and gentry of the city

Mr Thompson, Officiating Apothecary, proceeds to-morrow towards Lahore and Agia in anticipation of the two months' leave for which he has applied

An intercepted letter with the seal of Ameenoolah Khan, Chumkunnee, to Ameer Dost Mahomed Khan, of a treasonable nature, has been brought to me it professes to give the feelings of the people of Peshawur and of the Sikh troops as being inimical to the British, and that an invasion would be attended with success Ameenoolah Khan is a nephew of Kumurooddeen Khan of Chumkunnee, the ex-custodian of the Attock road, with whom he has long been at enmity, and it strikes me that the letter is a forgery to get the parties named in it into disgrace I am quietly trying to ascertain the point

The Governor paid me a visit and on my showing him the intercepted letter coincides with me in opinion.

Durreah Khan of Adzye, who escaped from Govindghur, accompanies Lieutenant Taylor to the limits of Kohat He says if we are

desirous of keeping the road to Bunnoo open it will be necessary to take the Afreedees of that quarter into pay

*4th February 1848*—Colonel Ruttun Singh attended with the report of the army and the proceedings of a court martial assembled by orders of Sirdar Goolab Singh, to try a Havildar of the Infantry for being drunk on duty and loading his musket for the purpose of shooting a Jemadar

The prisoner was found guilty sentenced to be dismissed the service, receiving 24 lashes on his back in front of the troops paraded for the purpose which sentence I have confirmed

Lieutenant Taylor marched this evening towards Bunnoo Sirdar Sultan Mahomed Khan with one of his sons accompanied him the Sirdar returns from Kohat, the son proceeding

*5th February*—A rumour is rife through the city that Ameer Dost Mahomed Khan has been assassinated by his nephew Shumshooddeen Khan I have no particulars.

Lieutenant Edwardes writes me that he hears the Vuzerees aided by a son of the Ameer of Cabool, meditate an inroad on Bunnoo and that Sirdar Sultan Mahomed's son, in command of the Afghan contingent is in communication with the enemy I replied that I believed the Afghans had too much to do at home to think of such an invasion, and that I was sure they were more in fear of us than we need be of them

The troops are now in arrears four months and I have not heard of any assets having left Lahore for them

Geo St P LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G G N W F*

*6th February*—No confirmation of the reports of the Dost's assassination, so it may be considered utterly false.

Geo St P LAWRENCE MAJOR

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No 6—Political Diary of Major George St. P Lawrence,  
Principal Assistant to the Agent to the Governor  
General, North West Frontier at Peshawur, from  
Sunday, the 6th, to Saturday the 12th February 1848.

*6th February 1848*—Yesterday the extreme penalty of the law was carried into effect on Hadjee of the village of Peer Surhagh for the murder of a girl to whom he was betrothed.

Sirdar Sultan Mahomed Khan returned from escorting Lieutenant Taylor to the Kohat Pass

*7th February 1848* —Inspected the whole of the troops, Regular and Irregular carried into effect the sentence of the court-martial on the Havildar of Ruttun Singh's Regiment I excused the corporal punishment on account of the general good conduct of the troops

In the evening with Lieutenants Lumsden and Bowie paid Sirdar Sultan Mahomed Khan a visit at the Wuzeeree Bagh.

Transacted business with the Governor, revenue and judicial

*8th February* —By arrangements made last evening I started at gunfire for the Fort of Doaba, Lieutenant Lumsden for Jumrood and Lieutenant Bowie for Barraha I returned at 2 P M, being detained crossing the Cabul river I am happy to say we found all right, except at the Fort of Barraha, where the Killadar was found absent, said to be in Peshawur

Under the Fort of Doaba a considerable village has grown up, the Hindoos of which petitioned to have a wall built to protect them from the inroads of the hill tribes in the neighbourhood I have consented to pay half the cost, they paying the other half

Lieutenant Christopher of the Indian Navy has reported the arrival of the steamer *Conqueror* at Kalabagh on the 2nd instant and his intention to proceed as far as Attock, if possible

*9th February* —This being the festival of *Bussunt* the Governor with all the officers, Military and Civil, waited on me and presented the usual Nuzzur, which I made over to the Government Treasury

Amused the officers by showing them the effects of gun-cotton fired from a pistol

The corpse of a man cut to pieces near Mashoo Guggar was brought in to-day, said to have been done by the Afreedees

The Mullik of Mutta brought in a man for killing his wife by kicking her in the stomach

*10th February* —I was unable from indisposition to hold my usual Durbar of Urbobs, but deputed Lieutenant Lumsden to see them

In the evening the Governor called and sat with me for some time, discussing various matters. He tells me that the army are well contented and most anxious to do everything to please us as for him self he is entirely bound to us.

Intelligence from Jellalabad of a recent date is that Mahomed Shah Khan Ghilzie has defeated the troops of Sirdar Golam Hyder near Lughman killing ten or twelve and causing them to retire on Jellalabad.

11th February 1848—Colonel Ruttun Singh attended with the reports of the force. His regiment has applied to give a feast to some hundred priests. I told him that I did not approve of collecting so many but as a special case I would sanction it.

Completed to-day the muster of the Ghorechurras, and on Monday propose paying up the arrears of those to be pensioned and discharged, etc

Lieutenant Lumsden with his Guides marched this morning to the village of Mutta to enquire into the Revenue Settlement of Momund and the villages under the hills, which, though subject to Peshawur, have hitherto paid no revenue, no Governor having had the power to enforce it. With him I sent the Urbobs of Momund and Kallah who are represented to me as having for many years by their reports deterred the Sikhs from visiting that quarter.

12th February—I have ordered the sale this evening of the hullocks of the Artillery condemned by me as unfit for the service.

With the aid of three non-commissioned officers of the Guides formerly in our Cavalry I have commenced instructing the Khas Dragoons in the English system of equitation and drill.

Still no accounts of the despatch of pay for the troops.

GEO ST P LAWRENCE MAJOR

*Principal Asst to the Agent G G N W F*

No 7—Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor General, North West Frontier, at Peshawur, from Sunday, the 13th, to Saturday, the 19th of February 1848.

13th February 1848—I regret to say the Governor was taken ill<sup>W</sup> last night on his return from settling a dispute about water, the distance being 12 or 14 miles, he started early and was out all day.

A report arrived from Colonel Bhaug Singh of his having crossed the Attock with his regiment of Cavalry

*14th February 1848* — The regiments paraded on their own parades consequent on the indisposition of the Governor.

With Lieutenant Bowie I visited the Governor, and sat with him some time, he seems more alarmed than really ill. Mr Thompson's absence I fancy has its weight with him. I purpose seeing him again this evening.

A Ghoorchurra named Kurum Singh presented a petition accusing Prem Singh, Ghoorchurra, and others with having made him drunk and committed an unnatural crime on him. I directed Suda Kahn Singh to assemble five officers of his corps and investigate the complaint.

*15th February* — The Sherie Regiment of Cavalry under Colonel Bhaug Singh arrived this morning from Hussun Abdall consisting of all ranks of 279 sabres, 218 being absent on command, etc. The horses and men I immediately inspected, and consider both very inferior to the Khas and Aukal regiments.

I have told the Colonel that in a fortnight I will inspect the regiment again.

I visited the Governor, who is regularly laid up.

*16th February*. — With Lieutenant Bowie visited the Governor, who is, I am happy to say, somewhat better.

We had heavy rain all yesterday. The canal which runs through the city being choked up, I have ordered it to be cleaned out, widened, and deepened.

The Nujeeb Regiment of Ameeri Khan I have ordered to occupy the cantonments vacated by Colonel Maun's Singh Poorbea Regiment, and purpose levelling the old cantonment of Colonel Holmes, which is irregularly built on what was formerly the Artillery parade, so that it may revert to its legitimate use.

*17th February* — Lieutenant Lumsden having completed his inspection of the villages under the Momund hills joined me this morning. He reports that there is no doubt they should pay revenue to the amount of 10,000 or 12,000 rupees.



Heid my weekly Durbar of Urbobs, who are all most anxious to pay the ateamer *Conqueror* a visit I have promised to take them with me if I can get away on her reaching Attock

Colonel Boodh Singh Maun, has reported his arrival with his regiment at Attock and his anxiety to come on to Peshawur I have written him to obey the Durbar and Resident's orders to remain where he is, that should his corps be required I will send for it

18th February 1848 — Lieutenants Lumsden and Bowie visited the Governor last evening and this morning and I am happy to say the old gentleman is better, our attentions are highly gratifying to him

I cannot get any one to take the farm of the tolla on the Attock, they are very unproductive though I have done my best by employing sepoya to superintend the collections they are too distant for me to have efficient control over them I would suggest that a contractor be obtained at Lahore or that they be put under Lieutenant Nicholson the Superintendent of Sind Sagur

I completed to-day my second inspection of the Ghorechurras I saw each man on foot and have selected out of those receiving cash paymenta 88 for pensions and 119 to be discharged, total 207

Received a complimentary letter from Ameer Dost Mahomed Khan asking me to restore the jagheer of one of his followers Sirdar Mahomed Hussun Khan; it was granted by the late Maharaja Shere Singh and confiscated last year by order of the Durbar I replied that I regretted financial pressure of the Sikh Government precluded my meeting his wishes

19th February — Talking to a Hindostanee sepoy late in the Sikh service, now in the Guide Corps I learnt that there is still some uncertainty in the minds of the Khalsa soldiery as to our intentions they appear to think that we intend to get rid of them by degrees

In Durbar I mooted the subject The Governor Colonel Ruttun Singh, Ram Sahai Singh and others declared that the Infantry were quite satisfied that it was not our intention to reduce their strength but they admitted that the Cavalry were not so certain that the Ghorechurra reduction now in course led them to fancy that their turn would come next. I desired that they might be informed we had no such intentions.

A letter from Lieutenant Taylor reports his having joined Lieutenant Edwades at Bunnoo on the 11th instant, when he found all quiet. He says "from the opinions of Afghan threats, which I have imbibed from you at Peshawur, I think the mood talked of here a very improbable event, but there is as you say no saying."

The Governor continues to improve in health, though he is too weak to leave his room.

Still no accounts of the pay having left Lahore.

GEO. ST. P. LAWRENCE, MAJOR,  
*Principal Asst. to the Agent, G-G, N-W. F*

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No. 8.—Political Diary of Major George St P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 20th, to Saturday, the 26th February 1848.

*20th February 1848*—With Lieutenant Lumsden I paid the Governor a visit and found him sitting up.

We also visited the lines of Maun Singh's Poorbea Regiment in which I have now located Colonel Meer Khan's Nujeeb Corps. The lines are much out of repair, I have ordered them to be repaired at the cost of the State.

*21st February*.—With Lieutenant Lumsden I visited the Governor.

I inspected five horses of the Artillery reported by Lieutenant Bowie as unfit from disease and lameness, one, which appeared to be glandered, I ordered to be shot and the other four to be sold by auction.

Lieutenant Bowie represents that many horses die and are lost to the service from the want of veterinary aid if a native farrier or two could be sent here from India, this evil would be remedied.

Colonel Ruttun Singh attended with the reports of the army.

I am happy to hear from the Paymaster that pay for two months has been despatched from Lahore for the troops; better it had been for four months.

*22nd February 1848*—At Lieutenant Bowie's request I inspected General Elahee Buksh's troop of Horse Artillery, the General puts them through several manœuvres in the English style very creditably. This troop is quite as well horsed as any of ours.

Transacted revenue affairs with Colonel Alla Singh whom I have requested to aid his father the Governor.

I have been obliged to imprison 12 contractors defaulters to the amount of 16 000 rupees revenue.

Certain stores of wine ordered from Scinde by Colonel Lawrence, to be conveyed by the steamer to Attock, were landed at Kalabagh and from thence brought on camels by Kohaut, have reached me in good order. My Chupper Bashee, who was in charge, states that the Afrees attempted to stop the camels at the Kohaut Pass, but did not succeed he being aided by a friendly Syed with a dozen Jezaulchees.

Two prisoners sent by the Kardar of Rawul Pindce escaped on the road at the village of Pubbee were discovered and brought in to me by two of the City Police. I gave them a present of four rupees for their zeal and activity.

*23rd February*—It rained hard all night and all day, so that our usual crowd of petitioners did not attend. It is fine for the crops.

Colonel Ruttun Singh brought the reports of the force. Two Sowars of the Shere Dragoons have returned from general leave which they have overstayed two and a half months. I have consequently directed them to be discharged as an example to others.

During Monday and Tuesday under the superintendence of Colonels Ruttun Singh and Ameer Khan I had fatigue parties of 200 men per regiment employed in pulling down the huts of Colonel Holmes' Brigade which they have most effectually done, with great zeal and alacrity the officers lending their elephants to aid in the work of destruction, the wood I have had collected for public purposes.

*24th February*—Heavy rain all day and night, no Durbar in consequence and little business transacted, beyond the daily City Police cases.

The whole face of the country is one sheet of water. I fear much damage to the houses in the city

25th February 1848—Continued rain, night and day; several houses are reported to have fallen and much of the city wall.

A report from the Soobadar on duty in the fort of Jehanghera says that hearing cow-killing was going on in the town, he sent a party to watch and seize the perpetrators, they came on a carcass, but only caught one man, whom the Soobadar confined. The following day the head of the town sent to tell him if the prisoner was not released they would take their own measures to effect it. I have ordered these pugnacious gents to be sent in to Peshawur.

26th February.—A fine sunny day The rain only ceased last night. Some 30 houses came down, but no loss of life, I am happy to say

I hear that the two months' pay for the troops has reached Khairabad on mules, so that I hope to disburse it in a few days, two months' more should be despatched without delay, for now that we have accustomed the troops to expect regular issues, it will not do to disappoint them

Intelligence from Cabul to the 15th instant mentions the illness of the Amcer and the continued rebellion of Mahomed Shah Khan, Ghilzie, but nothing of more importance

Lieutenants Lumsden and Bowie paid a visit to the Sirdar last evening and found him, I am happy to say, quite recovered.

Transacted business with Colonels Alla Singh and Ruttun Singh, revenue with the former and military with the latter

The amount saved to the State by my recent pensioning and discharging of Ghorechurras amounts in the former to 82,306 rupees, and in the latter to 32,487 rupees, total about 1,14,793 rupees per annum.

GEO ST. P. LAWRENCE, MAJOR,  
Principal Asst. to the Agent, G-G, N W. F.

No 9—Political Diary of Major George St P Lawrence, Principal Assistant to the Agent to the Governor-General, North West Frontier, at Peshawur, from Sunday the 27th February, to Saturday the 4th March 1848

27th February 1848—Ten mule loads of treasure arrived from Lahore in amount 80 000 rupees an order also on this Treasury for 60 000 total 1,40 000 short by 6 000, of what the Paymaster estimated

Seven prisoners arrived from Sirdar Lall Singh sentenced to seven years imprisonment for cow killing

28th February—The Governor, with his son Colonel Alla Singh, and Ruttun Singh attended and transacted business

Commenced the issue of pay for the months of *Katick* and *Magha* corresponding with 15th October to 15th December

The new Paymaster applied to me to know if the old deductions from the troops were to continue to be made I replied in the affirmative, till orders to the contrary were received from Lahore

I was much amused this morning A Khyber Mullik brought me a testimonial of good service from Captain H P Burn, and applied for service I told him I could only give him a sepoy's berth in the Police this he declined, but coolly said, 'I am going to Teera give me some money to take me there These gents seem to think they have nothing to do but to ask to receive cash

29th February—Completed issuing pay to the Khas Dragoons

With Lieutenants Lumsden and Bowie rode to the Fort of Barrah Hearing that it had sustained considerable damage from the late heavy rain we inspected it thoroughly and found the report true have accordingly ordered it to be repaired. The storekeeper was absent in the city without leave this being his second offence of this nature I have directed his discharge.

We likewise inspected the Barrah river at a point where it is proposed to form a *bund* to direct it into its old channel, which, if we can succeed in doing great benefit will result to the lands on both banks

We returned at about 11 A.M., having ridden 20 miles.

In the evening had a visit from Sirdars Sultan Mahomed Khan and Peei Mahomed Khan

Received a letter from Ameer Dost Mahomed Khan in reply to mine of the 25th January, relative to permitting the family of Hussein Khan, Guidezye, our pensioner, to join him; the Ameer says he never prevented them leaving, and supposes they do not wish to move. In reply I said that doubtless enemies of Hussein Khan's were the cause of the delay in their coming. I therefore hoped that the Ameer would himself send for them and pass them on to Peshawur.

The letter was brought by an old *cossid* of the Cabul Mission, with whom I had a long talk. He represents affairs to be much in the state that I have from time to time reported them.

*1st March 1848* — Visited the Fort of Shahmeer Ghur which has suffered but little from the recent rains. Also visited the jail in the city, which requires enlarging and repairing.

Colonel Ruttun Singh attended with civil and military papers, and the Governor called in the evening.

A man of the village of ——— is reported to have killed his brother-in-law by striking him with a spade on the head. The man fled, but his father and brother have been brought in, a custom which prevails here and through which alone the authorities at times are enabled to seize culprits.

Some Afreedees from the hills are said to have carried off a girl during the night close to cantonments; this is the second time this girl has been carried off. She was restored through another custom, which has long been in force here, but which I put a stop to, it is called "Bota Barampta," or taking the change out of the party offending, *i.e.*, this girl is seized by men of a village; the parents in return lay hold of any man or woman of that village and detain him or her till their own is restored. A cow is stolen and traced to a certain tribe or village; the party losing the animal may seize one or more animals of this tribe and keep them till he gets his own.

I have been several times urged by the Urbobs, as the only means of putting a stop to the depredations of the Afreedees, to allow the practice of "Bota Barampta" to be resumed, as there is no other way of getting at them, and I expect I shall have to comply.

Avitahle commonly huog all Afreedees caught steallog or plunder log generally without even the form of a trial

*2nd March 1848*—Held my usual Durbar of Urbohs and geotry

The Governor with Colooels Ruttun Siogh and Alla Siogh were with me for some hours traosactlog husioess

Several meo of the different regiments, old and worn out, having applied to be pensioed I have directed rolls to be prepared for trans mission to Lahore and after inspectlog the men will seod them to the capital for final orders

*3rd March*—Lieutenosot Lumadeo marched this mornlog to Mullozye to commence the settlement of the Tuppah of Dullozye Lieutenant Bowle and I accompanied him as far as the village of Palosee The whole face of the couotry is one sheet of cultivation

The Governor was with me for some time this evenlog and I drove him to my huggy through the city to the Jail to iospect it and arrange for its repair and enlargement. Sioce I have discontinued fining for crime the prisoners have greatly ioceased they now amouot to 230

I have classified them keeping defaulters and dehtors in the city, hurglars and thieves at work oo the roads to the Agency compound, and convicts and feloos in the Fort of Shahmeer Ghur

*4th March*—Rode through the city last evenlog to inspect the cleaning out of the canal sod the harracks of the Police, which have suffered from the recent heavy raso

Lieutenaot Bowie iospected 250 hullocks of the Artillery, about to proceed to Kutchi to hriog from Geoeral Cortlandt 50 hackeries which he has made up uoder orders from the Durbar

I have no recent lotelligence from the west here all is quiet.

Geo St P LAWRENCE, MAJOR,  
Principal Asst to the Agent, G G, N-W F

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No 10—Political Diary of Major George St P Lawrence, Principal Assistant to the Agent to the Governor-General, North West Frontier, at Peshawur rom Sunday, the 5th, to Saturday, the 11th March 1848

*5th March 1848*—Sunday

*6th March.*—With Lieutenaot Bowie inspected the whole of the troops Regular and Irregular, drawn up in review order Sirdar

Kahn Singh, Mujeetea, commanding the Ghorechurras, was precluded by indisposition from attending

Transacted business with Governor and his son, Colonel Alla Singh, who continues to assist his father

I presented Colonel Ruttun Singh, Maun, with a double-barrelled gun, to mark my approval of his conduct and exertions the Governor employs him as a sort of Adjutant-General, or confidential Staff

7th March 1848 —Rode out to Dullozye to see Lieutenant Lumsden and to confer with him on settlement matters, he appears to be progressing well Returned at 10 A M

Wrote to Lieutenant Christopher to ascertain the progress of the *Conqueror*, but my letter was returned by the Killadar of Attock, who said that the steamer had been obliged to return

Sirdar Mehtab Singh, Mujeetea, reports his arrival at Rawul Pindiee with his ten guns for Peshawur and their despatch thence under charge of Colonel Mit Singh, his brother I suspect.

8th March —Sent my tents out this morning to the village of Shaikh Cossum *ahas* Shaikhan, under the Afreedee hills, about a *koss* from the Fort of Barraha, at the head of the Momund Tuppah (district), and followed after transacting the business of the day.

The Governor, Sirdar Goolab Singh, Pohvindiah, has sent in an application for 2½ months' leave to proceed to his home for the purpose of marrying his youngest son, Lena Singh he wishes to start on the 25th instant

The Adjutant of Colonel Uttur Singh's Regiment arrived with a letter reporting the corps having crossed the Attock. I have directed on entering cantonments that they occupy the lines of the Khas Regiment on command at Bunnoo.

Lieutenant Bowie and General Elahee Buksh of the Artillery rode out with me some miles

On reaching camp a little before sunset I was met by the Mulliks of Shaikh Cossum and rode with them through the village, half of which is in ruins, said to have been so ever since it was attacked by Ameer Dost Mohomed Khan, the year Sirdar Hurree Singh was killed From



its proximity to the Khyber hills It suffers considerably from the incursions of these marauders

9th March 1848—Rode through the villages of Mooshterzye, Utmanzye, Koorā Khail and Mashoo Khail All are large, have much land attached, with a plentiful supply of water, but from their interminable feuds much depopulated.

Mashoo Khail is the village Lieutenant Lumsden *chapawed* last year to apprehend Dawur Khan up to that period a noted freebooter He is now in attendance on me. These villagers are said to be able to turn out 4 000 matchlockmen and more than once have beaten off the Sikh troops.

On crossing the Barrah river last evening where materials are being collected to make the *bund*, and a canal being cut to change the course of the river I was much amused at a huge athletic Afghan calling out to me, "I am from Mashoo Khail we are all at work"

This morning Urboh Futteh Khan told me with a grin that Mashoo Khail which had hitherto never furnished a man on any public work on this occasion had been put down for 50 ploughs, these they not only sent but added 10 more

Talking to Dawur Khan and other Mulliks of the folly of their continued feuds he said they arose chiefly from the weakness of the Sikh rulers, of which there can be little doubt.

Last night at this village of Shalkh Cossum an unfortunate Hindoo had one side of his face cut off and several sabre wounds on his body I took his deposition on oath, from which it appears that while sleeping he felt his *rasati* pulled at resisting which he was thus brutally cut. On his naming the assassin I called to the head Mullik to send for him on which he stepped out from the crowd that had collected near me The Hindoo immediately recognised him on which he said, How can you swear to me, what evidence have you? I have imprisoned him

10th March—Rode through the villages of Bullolzye, Mashoo Guggar Suleman Khail Shahab Khail Shalkh Mahomdee and Guree Malli Khail All but the first are large with much land though several of them have been twice their present size; the numerous trees here show the awe in which these villages have been held by the Sikhs Mashoo

Guggar is the one from which I last year received the civil message that they had never been in to Avitabile and why should they come to me, and for which I seized at once eleven Mulliks

In passing the house of the ringleader I laughingly asked him if he was now "Yaghee" (rebellious) "Not I," he replied, "I got a lesson from you."

It is quite terrible to see the ravages caused by the feuds among these people, they tell me that they have now ceased I trust it is so.

In the evening I rode to the Barraah river to inspect the progress of the *bund*, and was much amused to see the zeal with which all the people worked I should think there were at least 1,000 men and boys with double that number of bullocks.

*11th March 1848* — Marched to the village of Budwair, passing through those of Shahab Khail, Utmanzye, Ullizye, Ahmud Khail and Bazid Khail, the last four were for many years the jageer of Sirdar Futteh Singh, Maun, and have consequently been much impoverished from over-assessment I recently released the Mulliks from a long confinement on their giving security for arrears of revenue to be paid in two years.

My tents being late in arriving, taking two sowars I rode into cantonments, only distant six miles.

The Sirdar and Colonel Alla Singh called to report proceedings during my absence Colonel Uttur Singh, Maun's, Regiment arrived this morning, as did the ten guns for the forts The bullocks which brought the guns I have directed to return.

Intelligence from Jellalabad up to the 5th is that Sirdar Golam Hyder Khan had started with five horsemen to Cabul, in consequence of the serious illness of Ameer Dost Mahomed Khan.

I am thankful to say that all is quiet in this Province, the people appear well content, and I ride with two or three horsemen, which no Governor was ever known to do

GEO ST. P LAWRENCE, MAJOR,  
*Principal Asst. to the Agent, G.-G., N.-W F*

No 11 —Political Diary of Major George St P Lawrence, Principal Assistant to the Agent to the Governor-General, North West Frontier, at Peshawur, from Sunday, the 12th, to Saturday, the 18th March 1848.

12th March 1848 —As I return to camp to-morrow I inspected this evening Colonel Uttur Singh, Mauna, Regiment. It is by no means so good looking a corps as either of the other two Sikh regiments with me its strength——firelocks

I also inspected the guns, but will not allot them to forts till I return

The Governor with all the officers waited on me, those of Uttur Singh's Regiment presented nuzzurs. As the *Holee* commences to-morrow, at the Governor's suggestion, to mark my appreciation of the conduct of the troops during the last twelve months I sanctioned the sum of 1500 rupees being distributed out of the nuzzurs presented to me on my late visit to Lahore among the two regiments of Cavalry, six troops of Artillery, six Regiments of Regular Infantry and two of Ramgoles, to assist them in keeping the *Holee* festival

13th March —I rejoined my camp at Budwair, visiting the village of Deh Bahadoor *en route*

Have been engaged all day in the summary settlement, which progresses very slowly, the zemindars declaring they are too poor to undertake it.

The village is a very large one but like the others half in ruins, it has been several times burnt by the Sikh troops. I have just walked all round it, attended by a couple of chuprassees

14th March.—Rode out this morning to settle a dispute of long standing between the Mulliks of Budwair and those of Sorozye as to their right to a water mill. These disputes about water are never ending and used to lead to much bloodshed

Though absent from the city, the Governor sends me all the police and judicial reports.

The payment of the troops Regular and Ramgoles, up to the 5th December has been completed, but I have not heard of any arrangement being made to pay the Ghorechurras

*15th March 1848.*—It commenced raining last evening and poured torrents till 7 A.M., by which time my camp being nearly afloat and there being no prospect of my being able to move it, I left it standing with a small guard and rode into cantonments.

Crossing the river Barrah, which on Monday morning was hardly ankle deep, I found it beyond the saddle girths, and running like a sluice and the whole country flooded

Towards noon the sky cleared, and the Governor paid me a visit in the evening.

*16th March.*—It rained again all last night and part of to-day, no Duibar in consequence

The eldest son of Sirdar Peer Mahomed Khan is said to have quarrelled with his father and gone off to his uncle, Ameer Dost Mahomed Khan. Sirdar Sultan Mahomed Khan sent his son Noor Mahomed Khan to bring him back, but he would not come

Intelligence from Cabul up to the 7th instant confirms the report of the Ameer's illness and of the recall of his son, Golam Hyder Khan, from Jellalabad

*17th March* —Transacted business with the Governor and his son, Colonel Alla Singh

Received a petition in the name of all the Ghorechurras under Sirdar Kahn Singh, Majeetea, complaining of their being in arrears ten months and not receiving *Batta*. I replied that they should make their complaint through their Commandant. It would be desirable to call the attention of the Duibar to the necessity of paying their arrears, for they naturally expect to be paid as regularly as the other troops. The subject of *Batta* would likewise seem to require consideration

*18th March* —With Lieutenant Bowie rode through the city and round the fort to inspect the damage done by the rain and the progress made in clearing out the canal

I am happy to say that my *bund* of the river Barrah has suffered little, which gives me hopes that when completed it will stand any rise of the river

The Governor gave a *nautch* to all the officers in celebration of *Holee*, at which Lieutenant Bowie attended, making an excuse for me.

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Lieutenant Lumsden came in from his camp at Dullozye

I received a letter from the King of Khokand of four months date brought by a Cabul merchant named Alladad Khan, who was also the bearer of ooe to Major MacGregor, C B It is complimentary on heariog of our victories on the Sutledge and occupatioo of Cashmeer and the Punjab and professes great devotioo to British interests it mentions the arrest at Sultan Huzrut of a European, calling himself an Englishman, named Wyburd, and wishes to know if he is really our countryman, etc.

The Governor has oot received the Lahore Akhbar for five days

GEO ST P LAWRENCE MAJOR,  
*Principal Asst to the Agent, G G N.-IV F*

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No 12—Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor General, North West Frontier, at Peshawur, from Sunday, the 19th, to Saturday the 25th March 1848.

*19th March 1848*—This the last day of the *Holee* went off well no disturbance of any kind, 10 previous years this festival rarely ended without an affray between the Sikh soldiers and the townspeople

I have excused the General Parade to-morrow consequent oo the *Holee* endiog to-day it will take place oo Tuesday instead

*20th March*—The Governor brought all the officers to wait oo me on the conclusioo of the *Holee* they expressed on behalf of their men their sense of my kindness to them, saying that they had oot had such a festival since the time of Maharaja Sher Singh

In the evening General Elahce Baksh with the Governor came and took Lieutenants Lumsden and Bowie to a *nautch* at the house of the former at which were present all the officers

I have directed furloogh rolls of officers and men to be prepared and authorised the Paymaster to disburse two months' pay to such as are entitled to the indulgence so that they may start as soon as the Resident's sanction is obtained

To-morrow being the Mahomedan festival of *Nowrose*, I have sanctioned my office establishment and that of the Governor getting a

holiday The whole of Peshawur turn out into the neighbouring gardens for the day; they consider that if this day is passed happily, the rest of the year will be so too

*21st March 1848*—The troops paraded for exercise this morning on their private parades

I transacted business with the Governor and his son, Colonel Alla Singh

A petition has been presented by certain Ghilzie camel sowars setting forth that 350 camels, while they were pasturing near Kohat, as is their wont at this season, had been driven off by the Sepah tribe of Orakzyes I have written Sirdar Sultan Mahomed Khan to endeavour to have them restored

I said to the Ghilzies, being thieves yourselves, how can you expect to recover your property? "Though we be thieves," they replied, "we expect to obtain justice at your Durbar"

I inspected about 30 men of the different corps reported incapable of performing active duty and have ordered their pension rolls to be prepared The amount of pension must be left to be filled up at Lahore as I have not yet received the rules fixing the different rates

The Governor and Sirdar Kahn Singh, Majeetea, waited on me with a Robakaree in reply to the Resident's in the matter of Kurrum Singh and Pran Singh, Ghorechurras, as they are of opinion that to transfer these men to another station would be to brand them for ever I have acquiesced in their remaining here this I have done the more readily in consideration of the general good conduct of the Ghorechurras.

*22nd March.*—The Barukzye Sirdars were with me for some time, they complain bitterly of the Durbar taking up old claims against them Sultan Mahomed says, why were they not made ere he left Lahore, when he could have answered them on the spot? I have told them to produce any papers they may have on the subject to enable me to submit it to the Resident The Durbar have more than once directed the Governor to confiscate their jageers unless the amount is paid, but this extreme measure I would fain avoid for many reasons.

*23rd March.*—With Lieutenants Lumsden and Bowie rode to the Barrah river to inspect the *bund*, which is nearly finished; returned



by the villages of Surbund, Pushti Khara and Nowdeh, the Kardars of all these are in confinement for arrears of revenue. The change in the river's course will benefit these villages greatly

Held my usual weekly Durbar of Urbobs and gentry, talked to Mahomed Zuman Khan son of Allum Khan, Orakzye, about the seizure of the 350 camels of the Ghilzies. He says that the Sepahs are independent of all control, and that they cannot be coerced from the inaccessibility of their fastnesses

A report has been received from Eusufzye that the inhabitants of Naranji on the border attacked a *Bandah* or suburb of the village of Shiwhah in Eusufzye and burnt and destroyed it. Ameer Khan of Shiwhah collected the Ooloos of his district and made a foray against Naranji, bringing back with him 400 head of cattle, together with the head Mullik and some of his followers these I have ordered to be sent in for examination. This village of Naranji did not come in to Lieutenant Lumsden when making the settlement, and as it was by no means clear that it was a portion of Eusufzye, the attendance of the Mulliks was not insisted on. The Sikh troops on one occasion suffered a severe repulse from the inhabitants of Naranji

24th March 1848—Walked through the city by the banks of the canal which I am having widened and cleared out

Seven bullocks laden with salt were brought in last night seized near Akhora passing the line without paying the duty their owners absconded. I have ordered the cattle to be sold and the salt to be lodged in the Government store

Sirdar Sultan Mahomed Khan tells me that he sent his son Noor Mahomed Khan to try and recover the Ghilzie camels that at a conference with the plunderers they agreed to restore the cattle on payment of Rs. 10 a head but on no other terms will they give them up, and that he has no power to compel them from the nature of their country

A sepoy of the Mussulman Regiment was deputed to convey 50 rupees to some comrades on duty at Rawul Pindie, instead of doing which he went home spent the money and coolly returned, as if he had committed no fault. I have confined him, and directed the General to bring him to trial

25th March 1848 —The Governor was with me for some hours discussing the arrangements consequent on his approaching departure. We have arranged that the reports of the troops shall be made through the senior officer, General Elahee Buksh of the Artillery

Another petition from the Ghorechurras was presented stating that they were nine months in arrears and representing that they did not get *Batta*, while all the rest of the force did, even to the syces and bullock drivers.

Sirdar Kahn Singh, Majeetea, called during the day I took the opportunity to request he would cause it to be explained to the men under his command that I had represented their case to the Resident, and they must quietly wait the result

A Sikh native officer came up to me this morning when I was alone, and after talking on different matters said that I should continue to put into the several regiments an officer or two of other creeds, Mahomedans into Sikh and Sikh into Mahomedan and Poorbea Corps, so that I might rely on having correct information of what went on; that when all were of one faith little would transpire the hint is a good one and shall be acted on as opportunity offers

There is a report of the Ameer Dost Mahomed Khan being at Jellalabad, but as my news-writer at Cabul is silent I doubt it

The Governor, Sirdar Golab Singh, purposes starting in a few days, the Durbar purwanna granting him 2½ months' leave having arrived, it sanctions his son Colonel Alla Singh acting in his room I have acquiesced in the Governor's taking a guard of 60 men of all grades with him from those who would first proceed on leave

GEO ST P LAWRENCE, MAJOR,  
Principal Asst to the Agent, G-G, N-W. F

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No 13.—Political Diary of Major George St P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 26th March, to Saturday, the 1st April 1848.

26th March 1848—Rode with Lieutenants Lumsden and Bowie to see my *bund* at the Barrah river, it is nearly completed.

27th March 1848 — Inspected all the troops, Regular and Irregular, on Grand Parade

The report of the arrival of the Ameer Dost Mahomed Khan at Jellalabad is confirmed many people say he intends paying me a visit

The pay of the Sher regiment of Dragoons not having arrived and being told that they were in want of money I have directed the amount to be advanced from the Treasury and to be disbursed in my presence.

28th March — The Guide Corps marched this morning in progress to Lahore. At my request Lieutenant Lumsden has left with me for the purpose of drilling the Sikh troops two Duffadars and two Sowars of the Cavalry and three Havildars of the Infantry, subject to approval by Resident.

The Kardar (farmer) of Khuttuck, Hakim Rale, being a defaulter to the amount of Rs 13 000, I have placed him in restraint, with his two relatives Jowalla Sahale and Gunput Rale who went surety for him, the three are Commandants of Ramgules protégés of the Attariwallas

There are likewise many complaints of oppression and extortion against Hakim Rale

29th March. — Lieutenant Lumsden started this evening to overtake the Guides at Naushera. I cannot part with this officer without once more recording my sense of his services since he has been associated with me and the loss this Province will sustain in him

The Governor with several Commanding Officers represent that the troops are disinclined to send their letters by the Post Office, saying that they never reach their families they propose that they should take them to the post, and there pay the postage, getting the stamp affixed and then send them by their own messengers. I have consented to this pending the Resident's decision

I regret to say that a robbery attended with murder took place last night at Akerpora and that the murderer has not since been heard of

A Cashmeeree hunneah, who resides in the Wuzceeree Bagh, was cut down last night near the city and his son a lad of ten, carried off I have written to Sirdar Sultan Mahomed on the subject.

30th March — Rode to the Barrah river to see my *bund* the river has been turned into its original channel

A sentry of Ram Sahare Singh's Regiment was wounded last night on his post. I have issued a proclamation directing no Afghan to be out after 8 P.M.; thus I did after consulting the Urbobs.

Held my weekly Durbar of Urbobs and gentry, and afterwards took the accounts of the salt monopoly and some revenue matters for the last year.

*31st March 1848*—Rode to the cantonment of Suchet Singh and inspected the lines of Ram Sahare's Regiment and post at which the sentry was wounded on the night of the 29th; directed some walls in the vicinity to be levelled.

Presented the Governor with a khillut to the amount of Rs 1,500 on his departure and the approaching marriage of his son. At my recommendation he has declined the presents of the officers usual on such occasions, his son, Colonel Alla Singh, suggested this to me.

The Resident's Robakaree to the Durbar, with reference to my letter of the 28th ultimo suggesting the discontinuance of sundry deductions from the troops, has afforded lively gratification.

*1st April*—I have sanctioned two months' pay to be issued to the troops proceeding on leave of absence. The Paymaster having no assets, I have given it from the Treasury, to be refunded. Of the Regulars 1,331 of all grades are availing themselves of furlough.

The latest intelligence from Jellalabad and Cabul is up to the 20th and 25th ultimo, but is unimportant.

The Governor took leave of me this evening, he starts to-morrow.

GEO St P LAWRENCE, MAJOR,  
*Principal Asst. to the Agent, G-G, N.-W F.*

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No. 14—Political Diary of Major George St P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 2nd, to Saturday, the 8th April 1848.

*2nd April 1848*—The Governor marched this morning under the usual salute.

The body of a man with his head cut off was found near one of the gardens, apparently a traveller, his person had been rifled.

With the concurrence of the Governor consequent upon these recent murders and robberies I have issued a Proclamation warning all Afghans to keep at home from 8 P.M. till daybreak, and have directed the vicinity of the city and cantonments to be patrolled, all men found out to be seized and brought in prisoners.

The ease with which marauders can escape from the vicinity of the Khyber and Momund and Afreedee hills, renders it most difficult to apprehend them.

I rode to the Barrah river; my *bund* is finished and answers admirably; it only now remains to see if it will stand the freshes which come down from the hills with great violence.

3rd April 1848—I excused the Grand Parade this morning as the leave of absence men, 1,331 from the Regulars, had to receive their pay for the months of *Poh* and *Magh* which was issued in my presence.

Two *missuls* of Ghorechurras were likewise paid two months for *Sawun* and *Badhon*, corresponding with 9th July to 14th September.

The unfortunate man whose body was found yesterday, proves to have arrived from Kohaut, from whence he was sent to receive 36 rupees from some merchant in the city this money he obtained and it doubtless caused his untimely end. The police are endeavouring to discover the perpetrator.

The son of the Cashmeeree hunneah reported in my Diary of the 29th to have been carried off, was brought to me yesterday by Urboh Zereen Khan. The lad says he was seized by three Afreedees and taken to the hills on the road they were met by another party who fought for him, firing several shots at each other, the first however succeeded in retaining him the third night he contrived to escape and was found by the Urboh's men wandering about the base of the hills.

I regret to say that I have not yet succeeded in recovering the Hindoo girl reported in my Diary of the 1st ultimo to have been carried off from the village of Gykal by certain Afreedees.

The Jirgha (council) of the village of Naringi in Eusufzye, with their head Mullik, Zearut Khan, who is in confinement I had with me for some hours yesterday, and they have agreed to pay a small revenue to the Sirkar, a thing they have never previously done. I released their

Mullik and directed their cattle seized by Ameer Khan of Shiwah to be restored to them.

*4th April 1848* — Paid two *mussuls* of Ghorechurras this morning

The Vakeel of Sirdar Sultan Mahomed waited on me with copy of a reply from Raie Bhaug Singh, apparently to a letter from the Resident, on the subject of *Batta* to the Barukzye contingent when serving with the Sikh troops. I asked to see the original papers fixing the amount of contingent, etc., but was told that the Sirdar had no copy; that they were at Lahore. Sultan Mahomed says that his contingent being employed for more than two months entitled them to *Batta*, it would be desirable to get the original papers and that I should have a copy.

Shahzadah Hussein, son of Shah Timour and elder brother of the late Shah Shoojah-ool-moolkh, died last night. He enjoyed a jageer of about 7,000 rupees from the Sikh Government, he has left six sons, the two eldest he has long since disinherited.

Colonel Alla Singh transacted business with me, revenue and police.

*5th April* — Transacted military matters with General Elahee Buksh and Colonel Ruttun Singh. These officers daily attend at my quarters, receive the reports, listen to the complaints, etc., and then wait upon me with them. I have been induced to adopt this plan, finding that Ruttun Singh was carrying on all the details to the entire exclusion of his superior officer, General Elahee Buksh.

I have granted leave to the Ramgoles and Ghorechurras to the extent of  $\frac{1}{8}$ th of their present numerical strength.

*6th April* — With Lieutenant Bowie and Colonel Alla Singh rode to the village of Akerpoia to arrange for rebuilding its *bund*, which was carried away two months ago. The river at present is too high to attempt it, but in another month it will be feasible, and unless done then all the crops will fail. Rode through the village, which is large and straggling, densely populated. It was here the murder and robbery occurred, noted in my Diary of the 29th ultimo.

Held my weekly Durbar of Urbobs at which I told those of Kulleel that unless the Khuttrie's daughter carried off from Tykal was restored

In ten days I should fine each Urboh 5 per cent on his Government allowances.

Received a report from the village of Akora of two girls, aged nine and three, having been strangled and thrown into a well by a lad of 15, for the sake of their ornaments he has been apprehended and confesses saying that the devil put it into his head, the case is under investigation

Mr Apothecary Thompson rejoined from leave to Agra. Fortunately his services have not been required during his absence

*7th April 1848*—A seizure of 11 bullocks and two asses laden with contraband salt was made last night at the village of Rogey, the owners having absconded I have ordered the cattle to be sold

I have directed a Soobadar of Colonel Ruttun Singh's Regiment and sowar of the Khas Dragoons to be imprisoned for a month for highly insubordinate and mutinous conduct to Colonel Ruttun Singh and General Elahce Buksh in presence of several other officers. On the expiration of the month they will be paid up and discharged

*8th April*—Transacted civil and military affairs with Colonel Alla Singh and General Elahce Buksh.

Rode to the village of Poukah to inspect their aqueduct, represented to be in want of repair it is an ancient pukka built one and will require an outlay of 400 or 500 rupees, which sum I have directed to be expended on it

Seven prisoners arrived from Sirdar Lall Singh, Morana, sentenced to three years imprisonment for theft.

Intelligence from the west is of little moment beyond the return of the Ameer Dost Mahomed Khan to Cabul.

I have recently entertained a few Khyberies in the City Police, with a view to obtain early intelligence of proceedings in that quarter

An affray is reported to have occurred between two villages in Eusufzye in which several men on both sides were wounded I have ordered the parties to be sent in.

GEO. ST P LAWRENCE, MAJOR,

*Principal Asst to the Agent G G, N-W F*

No. 15 —Political Diary of Major George St P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 9th, to Saturday, the 15th April 1848

9th April 1848.—A Hindostance sepoy of Ramgoles under the influence of opium this morning cut down two of his comrades in the Fort of Shahmeer Ghur. He then ran to the top of one of the houses, from which he threw himself on being followed I had the three removed into my hospital

Visited the jail in the city and saw each prisoner pass in review

10th April —The troops paraded for inspection on their respective parades All the Commanding Officers afterwards attended at my quarters to make their *salam* Colonel Mehtab Singh, Moraria, applied for leave, but as the Commandant of his Corps has just proceeded on leave, I was obliged to refuse him; this I much regret as he has proved himself smart, intelligent and most zealous

Transacted business with Colonel Alla Singh and continued making the settlement of the Momund Tuppah, which I find very uphill work; the zemindars one day agree and the next decline the settlement

11th April —In consequence of the bankruptcy of Hakim Raie, Kardar of Khuttuck, and the necessity that exists to have a responsible person to look after the interests of Government in the approaching harvest, I have deputed Colonel Dhun Raj of Ramgoles on this duty

Alladad Khan, Cabul merchant, the bearer of the letter from the Ruler of Khokaud, waited on me to take leave and receive my reply I presented him with a *Zarafut* of 200 rupees and pair of shawls to the value of 150 rupees

I regret to say that the Khans of Eusufzye are still debtors to the State to the amount of 45,000 rupees of the revenue for the year 1904, this following so quickly the settlement made by Lieutenant Lumsden augurs ill for its permanency

12th April —Under instructions from the Resident on the subject of the troops transmitting their letters through the Post Office, I have directed General Elahee Buksh to proclaim the new arrangements, and



to urge the troops to give them a fair trial withdrawing my sanction to their sending letters by their own messengers

Sirdar Peer Mahomed called to claim compensation for the loss of 4,000 rupees in his jageer by the abolishment of the customs I told him I could not grant it, but would refer the matter to Lahore

Riding down the parade I found a large tank had in two days been excavated by the 7th Company of Colonel Ruttuo Singh's Regiment in direct disobedience of orders. I sent for the Colonel and ordered him to see it filled up by the company forthwith, which has been done. Were I not to be continually on the look out there would be no riding near the parades, for every man considers he is at liberty to dig holes wherever he likes

*13th April 1848*—Rode through the city and round the walls, returning by the village of Lundee through the fields which are highly luxuriant.

Held my weekly Durbar of Urboba and gentry reminded those of Khuleel that three days only remained of the period allowed them to produce the Hindoo girl carried off from Tykal by the Afreedees

General Elabee Buksh is laid up with fever and Colonel Jey Singh of the Artillery is said to have become insane I directed Mr Thompson to visit them.

Allee Jao Khan Jewanahere, Kazulbash has waited upon me with a petition praying for consideration from the British Government for services at Cabul he produces testimonials from the late Sir W H Macnaghten Captain Trevor and Captains Mackenzie Johnson and Warburton and accounts for the delay in submitting his claim to his not previously being able to get his testimonials from his friends with whom he had lodged them on leaving Cabul

*14th April*—Rode through the city while Lieutenant Bowie visited the lines to transfer bullocks from the several troops to that of Colonel Jey Singh's which having no horses I have made into a Bullock Battery

The Regular Troops are now in their fifth month of arrears while the Ghorechurras are in their seventh two months pay for the former is said to have left Lahore six weeks ago, but as yet has not reached this. The late Governor-General's anxious desire was that the troops

should never be more than two months in arrears; the Durbar require constant urging on this head.

Transacted civil and military business with Colonels Alla Singh and Ruttun Singh

I had intended visiting Jumrood this morning, but was prevented by a heavy storm of thunder, lightning and rain

Urbob Futteh Khan of Momund brought me the Jirgha or council of the Janikhore and Kohie tribes, thirty of whose horsemen enjoy a jageer of 4,000 rupees to keep their clans from plundering, these men of late having been remiss in their duties, the Jirgha propose their discharge and that the jageer should be made over to them. I conciliated and told them the subject should be considered

*15th April 1848* — Lieutenant Bowie visited the Fort of Jumrood this morning and found all right I purpose sending one of the guns lately received from Lahore to this post, one to the post of Barraha and one to that of Doaba

An Afghan calling himself a Vakeel from the Ruler of Budakshan waited on me, but having no credentials I told him I could take no notice of him till he produced them I asked him about the European said to be at Khokand, but he could give no information beyond having heard the rumour

Intelligence from Cabul to the 7th instant, but of no importance, the news-letter I have sent to the Resident.

GEO ST P LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G.-G., N-W F.*

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**No. 16** — Political Diary of Major George St P Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 16th, to Saturday, the 22nd April 1848.

*16th April 1848* — Pay for the Regular Troops for the months of *Poh* and *Magh*, from the 14th of December to the 9th of February, arrived this morning, having been despatched from Lahore one month and twenty days

It has rained all day I have consequently excused the Grand Parade for to-morrow the soil here being such that after rain there is no moving out.

Ramgoles to the number of 448 have proceeded on leave

17th April 1848—A report from Mahomed Khan, Hotee states that the Pulliwala sowars are again plundering that they had recently carried off 175 head of cattle from one of his villages I have told him to retaliate on them

Transacted business civil and military, with Colonels Alla Singh and Rattun Singh

Two Hindostanees, named Emam Ali Shah a sowar in the 4th Irregular Cavalry and Fuzzul, a Mistree in the 6th Troop 5th Light Cavalry were brought to me by an Afghan who released them from captivity in Turkistan by paying 150 rupees for them the Mistree has lost all his toes

18th April—With Colonel Alla Singh went over the accounts of the Treasury for the last year 1904 previous to their being sent to the Durhar

Eighteen copies in Nagri and Persian of Griffin's Field Exercise having arrived I distributed the same to the Sikh Infantry Corps much to the gratification of the officers I still require the Cavalry works

Commenced the issue of pay to the troops for *Poh* and *Magh* from the left, Colonel Uttur Singh's Regiment.

19th April—Paid Meer Jung Ali's Regiment this morning

On taking the accounts of the ferries on the Attock and Lunda for three months, I find the receipts of the former amount to Rs. 1065 1-6 and of the latter to Rs. 1,242 4-6 while the cost of collecting is 120 rupees exclusive of the pay of 36 Sergeants, Havildars and aepoys amounting to rupees———, these men are likewise employed as collectors I have tried to get contractors for these ferries but without success.

20th April.—Held my weekly Durhar of Urbobs at which we discussed the affairs of the Khyber, the tribes of which are fighting daily together

The Urbobs congratulated me on the results of my Proclamation of the 2nd instant, not a murder or robbery outside the city having since

occurred. Nothing but strong measures they say will keep the Peshawars under subjection.

Two sepoy (Ramgoles) on duty in the Fort of Doaba having some claims on a Binnerh seized his goods and shut up his shop. I have ordered them to be discharged and the property restored to the owner.

Transacted business with Colonels Alla Singh and Ruttun Singh and paid Colonel Mehtab Singh's Regiment.

*21st April 1848*—Rode to Raja Suchet Singh's cantonments and saw Colonel Ram Sahare's Regiment put through eight or ten evolutions by the Commandant in a very creditable manner. Afterwards visited the parade of Colonel Utun Singh's Regiment, and found it at company practice; this corps is the most backward of all at English drill.

Paid Colonel Ruttun Singh's Regiment and gave two men their discharge at their own request.

Received from Lieutenant Nicholson one Chundur, condemned to imprisonment for life, with Robakaree from Lahore.

Hussain Khan, Gurdezy, pensioner, who has been waiting here for some months in expectation of the Ameer Dost Mahomed letting his family join him, waited on me and begged I would write once more to the Ameer on his behalf, which I have consented to do, though I fear with little avail.

One of the city patrols under a Naib Kutwal was fired on last night by some robbers, while patrolling near the city, no injury done, but the miscreants escaped through the neighbouring gardens.

*22nd April*—Visited this morning the parade of Colonel Meer Khan's Nujeeb Battalion and found the Second in Command putting them through the evolutions. The Colonel says he has never been in the habit of giving the word of command, not having voice sufficient. I recommended him to practice.

General Elahee Buksh is still seriously ill, and Colonel Jey Singh not better. I visited both these officers, the General was much pleased, but the Colonel took little notice of me, he refuses to take Europe medicine.

Lieutenant Nicholson writes me that he hopes to be with me on the 27th or 28th, unless I have any work for him on the road. I certainly

have work both in Khuttuck and Eusufzye, but fear to keep him in tents at this season as it would lay him up, if not endanger his life.

I finished to-day the revenue settlement of the Momund district, but regret to say without being able to persuade one village to take the settlement all preferred the Kardar aystem I was compelled to revert to it, this too although the zemindars admit the present harvest to be unprecedentedly flourishing

Paid Colonel Ruttun Singh's Regiment and transacted business with the Colonel and the Deputy Governor

Visited the Gor Khuttry on the Cazeer representing that he required more accommodation for his court house fixed on a large room on the lower floor and left him well satisfied, he complains of a want of Moonshies, there being so much more writing now than of old. I told him I would see to it

I have no intelligence from the west

GEO ST P LAWRENCE, MAJOR,  
Principal Asst to the Agent, G G, N W F

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No 17—Political Diary of Major George St P Lawrence, Principal Assistant to the Agent to the Governor-General, North West Frontier at Peshawur from Sunday the 23rd, to Saturday, the 29th April 1848

23rd April 1848—Sent purwannas to the Eusufzye Khans advising their quickly sending in the balance of revenue due if they wished to retain their present position

24th April.—With Lieutenant Bowie inspected the whole of the Troops Regular and Irregular in Review order

After the parade saw all the officers on the ground and again at my quarters.

General Elahee Buksh is reported by Mr Thompson to be much better

Colonel Meer Khan's Regiment received their pay this morning

25th April—Under escort of a company of Poorbeas and 25 Gborechurras sent one of the 9-pounders lately received from Lahore to

the Fort of Barraha, and two 3-pounders into the Gor Khuttry, which latter will enable me to withdraw the Horse Artillery guns hitherto in that post

The Shere Regiment of Cavalry were paid this morning, the horses are much improved since arrival, but it is a very indifferent looking corps

*26th April 1848*—Indisposition prevented me this morning receiving the daily reports of the troops or of seeing Sirdar Peer Mahomed, who called to take leave on proceeding to the Doaba

The Khas Dragoons were paid at my quarters, but not in my presence; all went on quietly; the new Pay-master gets on well.

Under escort of a company of Meer Jung Ali's Regiment sent a 9-pounder to the Fort of Jumrood; this makes two 9 and two 3-pounders in that post.

*27th April*—Lieutenant Nicholson joined me this morning from Hussun Abdall I regret to say he is labouring under a severe attack of fever, which has reduced him much

Sirdar Peer Mahomed paid me a long visit prior to proceeding to his jageer I spoke to him on the subject of keeping his contingent in Bunnoo paid up He said he did his best, but it was not an easy matter, as they all more or less were paid by small grants of jageer; however that he would do his best. He certainly appears the wisest of the three brothers

The son of Sirdar Syed Mahomed likewise visited me on behalf of his father to complain of the people of Jungee, a hilly portion of his jageer, refusing to pay their revenue, and requesting that should they come in to me to complain I would punish them I told him I would investigate and act accordingly

Syed Mahomed is in great financial embarrassments and is said to be plundered much by the people about him

Received intelligence from the Resident of the disaster in Mooltan and of Messrs Agnew and Anderson being wounded, and that two regiments from Huzara and the one at Attock had been directed to proceed to that quarter, but that my force would not be touched Replied that I considered it would be hazardous to withdraw a man from this

side of the Jhelum for that, although we were all quiet, with such a fickle people to deal with as we had there was no knowing what effect the news might cause.

Sent an express to Colonel Boodh Singh to prepare boats on the Attock but not to embark till further orders

All the officers of the Regular Troops waited on Lieutenant Nicholson with nuzzurs which he returned. Took the opportunity to quietly caution them to be on the alert and instantly report any unusual movement among their men they assured me I might place every reliance on the troops, and I believe them.

Held my usual weekly Durhar of Urbobs and gratified them by announcing that I had directed a place of prayer to be erected near my house for the use of all who attended my Court.

*28th April 1848* —Hearing that Ursulla Khan of Zedah was showing symptoms of disaffection and had refused to let his son Bahram Khan send in some 80 horse which he kept up I sent him a purwanna to attend on me forthwith and detached a party of police to bring him in by force should he not promptly obey, instructing Bahram Khan to aid the party

Had a long conversation with Sirdar Sultan Mahomed, who evinces much gratitude for my forbearance in not carrying out the repeated orders of the Durhar to confiscate a portion of his jageer in liquidation of some old claim against him.

Sirdar Kahn Singh Mujeetea with all the Ghurechurra officers waited on Lieutenant Nicholson with their nuzzurs which were returned. I spoke to the Sirdar to keep his eyes open

Received a letter from Colonel Boodh Singh reporting that he had got the boats ready and asking for orders as to the withdrawal of his two companies from the Fort of Attock and Ghebe district. Directed all to stand fast for the present.

*29th April* —Transacted business with Colonels Alla Singh and Ruttun Singh, civil and military

The Regular Troops being all paid, commenced disbursing in the Ramgoles

Received intelligence from Lieutenant Herbert, 18th N. I., that he was under orders to join me as Drill Instructor with six native non-commissioned officers. I sent him a route which would bring him here in 14 days and requested him to move with all practicable expedition.

Inspected a Resallah of the Shere Dragoons joined from escort duty with Lieutenant Nicholson, found many bad horses among them.

Deputed Lieutenant Bowie this morning to visit the Fort of Jumrood to post the new gun and inspect the magazines, he returned about 9 A.M. and reported all right, and the garrison on the alert.

Mr. Thompson has taken Lieutenant Nicholson under treatment, and I am happy to say he already seems better.

An artilleryman, late in Dost Mahomed Khan's service, applied to me to be entertained, saying he had left from receiving no pay. I declined taking him.

Hearing that the Jageerdar Ghorechurras borrowed horses to stand muster, I have had them all branded to prevent such tricks in future.

There is no intelligence worth recording from the west.

GEO. ST. P. LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G-G., N-W. F.*

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**No. 18.—Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 30th April, to Saturday, the 6th May 1848.**

*30th April 1848*—I have granted Colonel Jey Singh, Artillery, three months' leave to proceed home for the benefit of his health, and have directed him at the expiration of that period, should he not be restored, to wait upon the Resident for an extension.

Received intelligence from Lahore of the murder of Messrs. Agnew and Anderson at Mooltan, of the detachment of Sikh troops having gone over to the enemy, this latter has not surprised me as under the circumstances I much doubt if our own sepoys would have acted otherwise. I trust signal punishment will quickly follow Moolraj's treachery.



The news appears greatly to disturb Colonel Alla Singh, but he seems constitutionally timid, still he told me to avoid making any difference in my mode of carrying on work or intercourse with the troops good and sound advice.

1st May 1848 — The troops were inspected by Commanding Officers on their respective parades

The weather having become too hot for evening parades and drill I have excused them for the present, much to the gratification of the troops

I was happy to see General Elabee Buksh with the other officers at my Durbar this morning, he looks so ill that I advised his keeping at home for another week he is a willing but not over wise man, wants consistency and energy

Heard from Captain Abbott in Huzara that he was all right in that quarter the reported Puklee inroad had turned out nothing He had sent a company from Colonel Baboo Pandab's Regiment to relieve Boodh Singh's in the Fort of Attock

Transacted business with Colonel Alla Singh and Colonel Ruttun Singh.

2nd May — Received five prisoners from Sirdar Lall Singh, Moraria sentenced severally to three years imprisonment, one prisoner is reported to have escaped *en route*

Paid the 1st and 2nd Ramgole Battallions yesterday and this morning

Husseln Khan Gurdezy, our pensioner, who has been waiting many months here in hopes of getting his family from Cabul, and had almost given it up in despair, tells me that he hears the Ameer has at length relented and that they are now *en route* to Peshawur

Ursulla Khan, Chief of Zedah, sent for by me on hearing that he was about to create a disturbance, arrived this morning bringing with him 80 horse which he has kept up with a view to plunder the country I have located him in my compound till I can make an arrangement for his disposal

Moollah Allie Ahmed, who accompanied Sirdar Lena Singh to Calcutta, paid me a visit, introduced by a note from the Resident.

*31<sup>st</sup> May 1848*—With Lieutenant Bowie inspected General Elahee Buksh's and Commandant Sekunder Khan's Troops of Artillery, we found ten guns fully horsed and equipped, the remaining two are on command at Bunnoo

After the parade we visited the Fort of Shahmeer Ghur and posted three guns of those which lately arrived from Lahore.

Paid the garrisons of Shahmeer Ghur and Barrah.

Purwannas arrived from the Durbar to the Governor, Sirdar Kahn Singh, and the Jageerdar Ghorechurra Sirdars, directing the latter to proceed forthwith and join Raja Shere Singh at Chicha Wutnee. Although this reduces my Cavalry by 260 sabres, and I have had no communication from the Resident on the subject, I have directed the order to be promptly obeyed.

The purwanna to the Governor adds that, if he requires more troops, he can send for Colonel Boodh Singh's Corps from Attock, this I think of doing when satisfied that the fort is safe with its present garrison and a new Thannadar is appointed. Lieutenant Nicholson tells me, and I can well fancy it, that the corps suffers much from being exposed at this season to the heat in tents.

*4<sup>th</sup> May*—With Lieutenants Nicholson and Bowie paid Sirdar Sultan Mahomed a visit at his garden house, which he has recently built in the Wuzeeree Bagh. Could the Durbar but see what sums he has laid out in its furniture, mirrors, chandeliers, etc., they I think would be satisfied that he has no evil designs towards the State. He was as usual profuse in professions of friendship towards us.

Held my weekly Durbar of Urbobs, which was numerously attended. Spoke to them about establishing a village police throughout the Province, in consultation with them prepared a short and simple Code for their guidance, which will be submitted for the approval of the Resident previous to proclamation.

Transacted civil and military affairs with Colonels Alla Singh and Ruttun Singh.

I have been engaged in trying without success to find out the writer of a Persian letter to the Resident accusing Commandant Surmust Singh of Ghorechurras, late Thannadar of Govind Ghur, of treasonable

intentions towards the State in conjunction with Maharaja Golah Singh Sirdar Kahn Singh tells me that the Commandant is a very respectable character and not too likely to be engaged in such practices and moreover that there is no good feeling between him and the Raja consequent upon his having confiscated, in the time of Raja Jowahir Singh, a considerable amount of property of Golah Singh's.

I tried to ascertain from Durrah Khao of Adyzye whether the Commandant was accessory to his escape from Govind Ghur, but he would not disclose anything. My opinion is that the story is a fabrication throughout, for had the writer been, as he says, actuated by proper motives he would surely have made his charge to me, thus courting investigation instead of stabbing in the dark.

*5th May 1848* — With Lieutenant Bowie inspected Futteh Khao's and Tara Singh's troops of Artillery. Six guns are effective and four at Bunnoo two have been recast and will be effective when the carriages now in hand are finished.

I am happy to say a large stock of wood has arrived from Chuch and Kutchee, and 50 new hackeries from the latter place, so that we shall now soon get our gun carriages in hand. I purpose building one general workshop to be superintended by Lieutenant Bowie, only allowing artificers to proceed with the troops on field service. In like manner I have built a general grain store for the Artillery, by which I expect to feed the cattle better and at much less cost.

Sirdar Kahn Singh, Mujetea reports that one of his Ghorechurra sentries was fired at last night he returned the fire but without effect. I have told him to send out disguised rounds for some nights.

Paid the garrisons of Doaba and Huahnnuggur and transferred them to the forts of Khyrabad Jehangheera and Nowahera.

Transacted business with Colonel Alla Singh and General Elachee Buksh, the latter is quite recovered.

*6th May* — With Lieutenants Nicholson and Bowie inspected Colonel Alla Singh's Troop of Horse Artillery and Jey Singh's Bullock Battery the latter was intended to be horsed, but seeing when at Lahore that my brother Colonel Lawreoe had fixed that we should have one battery of this description, I transferred from other troops the heavy

guns and allotted them bullocks, and it is now a most serviceable battery of six guns.

Colonel Alla Singh had only four guns effective, two having been recast, their carriages are making up, a good number of horses are wanting to complete in all the troops. We can turn out 26 effective field guns exclusive of the six on command at Bunnoo.

Hussein Khan Gurdezy's family have arrived from Cabul. In sending them the Ameer Dost Mahomed Khan has given good proof of his wish to continue on friendly terms with us, as many of his people were much opposed to their being allowed to come, the Syuds of Gurdezy in particular. From what I heard I did not expect to see them.

A report has come in from Nowshera of a corpse having been found hanging from a tree on the roadside, investigation has been directed.

Sirdar Kahn Singh brought me Surmust Singh, Commandant of Ghorechurias, the poor man is greatly distressed at the accusation against him. I soothed and told him I should report my disbelief of it.

The Jageerdar Ghorechuria Sirdars called to take leave, they march to-day pursuant to the Durbar's orders. I expressed my satisfaction at their and their men's conduct since they have been with me, and told them I should report the same to the Resident, they expressed their hope that on the completion of the present service they might be allowed to return to Peshawur.

I have no recent intelligence from the west, the Khyberees are said to be fighting among themselves, but I fancy with little bloodshed. We are quite quiet.

GEO ST P LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G-G, N-W F.*

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**No 19.**—Political Diary of Major George St P Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 7th, to Saturday, the 13th May 1848

7th May 1848 — Colonel Ruttun Singh attended with half-monthly present states. There are of all grades 4,000 present effective Regulars,

about 900 Ramgoles exclusive of 1000 in garrison at the forts, and 500 Ghorechurraa.

In talking to Colonel Alla Singh about the expediency of calling in Colonel Boodh Singh's Regiment at Attock he recommended me not saying we had troops enough just now

*8th May 1848*—With Lieutenants Nicholson and Bowie inspected the whole of the troops, Regular and Irregular, on Grand Parade 26 guns fully equipped were in the field

After the parade called the Colonels Commandants and Adjutants to the front, talked to them a little, received their salutes and dismissed them

Transacted civil and military matters with Colonel Alla Singh and General Elabee Buksh the former read me a Circular letter from his father, Sirdar General Golab Singh Bahadur, addressed to all the officers of the force calling on them to show by their vigilance activity and attention to their duty and my wishes, their sense of what they owed to the British Government for all that had been done for them

Alla Singh advised that this should not be given to the officers, as it might put it into their heads that we just now doubted them or were afraid of them seeing the justness of his conclusion I acquiesced

*9th May*—Received letters from Mr Cocks and Lieutenant Lumsden of the 5th instant from Lahore advising my sending Mrs Lawrence to Lahore. Strange coincidence, at the same time a letter came in from Lieutenant Taylor at Bunnoo recommending I should send her to Kohaut under charge of the Barukzye Sirdars.

Replied that my sending her away just now would at once stamp us as being afraid and having no confidence in the troops or my position here either of which would be detrimental to our cause that I never looked to the dark side of things, and had been in many a worse position, and would still trust to Providence by whom I had hitherto been so wonderfully supported.

Heard from Captain Abbott from Huzara all quiet in that quarter, though he had detached a large portion of his troops to Chilcha Wutnee under Sirdar Jhunda Singh

By Lieutenant Lumsden's letter the Resident sanctions my raising a corps of Pathans, 8 companies of 75 men each, or 600, at a monthly cost of Rs 5,700, the Colonels, Commandants and Adjutants to be taken from the Sikh troops. I shall accordingly proceed to enlist actively though quietly, such a corps may prove very useful.

A small body of horse as a personal escort would be very desirable. I feel the want of them now the Guides are away, the Sikh Cavalry are of little use to employ about the country in small parties.

Received the reports of the troops from General Elahce Buksh and Colonel Ruttun Singh, they are made as usual in my verandah.

Deputed Lieutenants Nicholson and Bowie to visit the fort of Hushanaggar, distant about 15 miles north-east on the summit of an oblong hill averaging from 1 to 200 yards in width by 300 long, it has originally been strong but for many years much in decay, it has no guns and the garrison is weak.

10th May 1848 — Transacted business with Colonel Alla Singh and General Elahce Buksh, though not up to much, being suffering from low fever.

After talking to the other Colonels, Meer Jung Ali, Ameer Khan, Ruttun Singh and Mehtab Singh, I took Bhag Singh, Man, aside, and told him to be under no apprehension for the safety of his uncle, Sirdar Kahn Singh, during his captivity with Dewan Moolraj, etc. He asked if he might send one of his sowars disguised to bring intelligence. I replied he might, but that I did not see what good would result therefrom that the man would certainly be discovered and some people might lead the Durbar to suppose had been sent to intrigue with the enemy, this appeared to satisfy him and he said he would give up the idea.

Wrote to Captain Abbott, Lieutenants Edwardes and Taylor. The latter wants me to send him a regiment, regretted I could not spare one, but said I would enlist and send 300 Ramgoles and 100 Khyberees, the first would do for his fort and the other for outpost duties, they having no objection to fight against their brethren in the faith.

Cazee Golam Khader, Vakeel of Sirdar Sultan Mahomed Khan, waited on me to request an interview for his Chief.

11th May 1848 — Though by no means well, held my weekly Durbar of Urbobs thinking that if I put it off or deputed Lieutenant Nicholson, erroneous impressions might get abroad.

Lieutenants Nicholson and Bowie rode round the several parades and saw the men all out at drill which they seemed performing willingly and zealously

General Elahee Buksh with Colonels Ruttun Singh Mehtah Singh, Meer Jung Ali Ameer Khan, and Ram Sahae Singh made their *salam*s after receiving the morning reports

I entertained 120 Ramgole recruits this morning for duty at Bunnoo

Purwannas arrived from the Durbar recalling Mutsnddle Singh the Thannadar of Attock and Wuzeer Khan, the Commandant of Artillery, and appointing Goormukh Singh ex Thannadar of Govind Ghur in the charge of the Attock Previously to giving them out I sent for Sirdar Kahn Singh, Mujeetea, and had a long conversation with him he recommends Goormukh Singh strongly and vouches for his fidelity I then sent for him and pointed out how proud he should be and sensible of the trust thus reposed in him, he expressed himself highly gratified.

He is the Sirdar mentioned erroneously under the name of Surmust Singh in my Diary of the 4th instant as being reported to the Resident in correspondence with Raja Golab Sing

Had much conversation with Colonel Alla Singh, who declares the troops here are all well content and well disposed.

Heard from Captain Abbott wishing to know if four companies of Colonel Boodh Singh's Regiment could be spared him from Attock, to which I replied affirmatively

12th May — Transacted military and revenue matters with General Elahee Buksh and Colonel Alla Singh and afterwards saw several of the Commanding Officers. Colonel Ram Sahae Singh is the one I least like among them, he never can look me in the face he is not popular in his corps and is said to take money from the men

Enlisted some 56 more Ramgoles it is astonishing what a number of Idle Punjahies and Poorbeas are hanging about

Mr Thompson acquaints me that Ramsay, the European adverted to in my Diary of the 18th August 1847, now an Adjutant in Sekunder Khan's Troop of Artillery, informed him that he overheard some of his men consulting a strolling fakeer as to which would be a propitious day for the Khalsas to rise, a book was opened, leaf turned up and the 13th of this month of *Jath* and corresponding to the 22nd instant named

Although little reliance is to be placed in anything Ramsay says I have told Alla Singh to ascertain the facts if proved to be true and I can bring it home to the fakeer, I shall not hesitate to make an example of him

Sudar Sultan Mahomed Khan with his son Noor Mahomed Khan paid me a long visit and slightly hinting (for Colonel Mehtab Singh, Morar, was present) at the reports of Sikh disaffection told me that he and all his were my bondsmen, that there was nothing under the sun he would not do for the British Government, and that he considered it was we who had released him from captivity and he only panted for an opportunity to prove in deeds, not words, his gratitude I quietly thanked him, expressing my reliance on him, but that I had no idea we should ever require to put him to the proof. His honor, his ease, the enjoyment of his family, all he added were the results of our position in the Punjab, for that I must have well seen in the continued attacks made on him and his brothers by the Durbar what little he had to expect from them, and much more to a like effect

13th May 1848 — Lieutenant Bowie looked at four troops of Artillery at exercise without guns, and reports favourably of their evolutions

I paid the garrisons of Khyrabad, Jehangheera and Nowshera, which completes the payment of the Ramgoles for *Poh* and *Magh*

Am selecting, in consultation with Colonel Alla Singh, Sikh officers for the new regiment of Pathans

The two Hindoostanee Duffadars of the Guide Cavalry left with me by Lieutenant Lumsden as Drill Instructors for the Cavalry are making themselves very useful in bringing me intelligence of what passes in the Sikh lines, in this particular I greatly miss the Guides, for they were usually employed last year by me on this duty, and well they fulfilled it



Ramsay tells me that General Elahee Buksh desired him to warn me that the Sikh regiments were not to be trusted. I trust the General is mistaken and only wants to enhance his own services. We must expect reports of all sorts to be rife just now. Our situation is certainly not an enviable one, having no escort of our own, but I never despair hope to the last.

Two agents from Moolraj are said to have arrived and visited Colonel Ruttun Singh one proceeded after the interview towards Cashmere and the other to Mooltan. I do not credit it, but have set people to work to find out its truth or otherwise, whatever I do I must not appear to doubt the troops.

I have no intelligence from the west, there are few troops at Jellalabad and none nearer. A Khyber Chief offered to bring me as many thousands of his people as I liked, to which I replied, wait till they are wanted. Peshawurees need would be the Khybercees opportunity.

GEO ST P LAWRENCE MAJOR,  
*Principal Asst to the Agent G G, N-W F*

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**No 20 — Political Diary of Major George St. P Lawrence  
Principal Assistant to the Agent to the Governor  
General, North West Frontier at Peshawur from  
Sunday, the 14th, to Saturday the 20th May 1848**

*14th May 1848* — Wuzeer Khan Commandant of Artillery in the Fort of Attock presented himself this morning and complains of the treatment he has experienced from Mutsuddie Singh Thannadar. I have directed him to make out a statement, and told him that he should not have come to me but have at once obeyed the Durbar's order and proceeded to Lahore.

Reports are current that Raja Golab Sing with a large army has gained a victory over the British troops at Lahore—false of course, circulated by some evil-disposed persons.

Received a letter from Lieutenant Taylor of the 6th instant, also from Captain J. Abbott both mention continued reports of meditated risings among the troops.

15th Mar 1848.--The troops were inspected on their respective parades by Officers Commanding Regiments.

Transacted business with Colonel Alla Singh and General Elahee Buksh; the latter tells me that he has no present cause to doubt the fidelity of the Sikh regiments, though from former experience he thought it as well to give me a caution through Ramsay, that should he observe any unusual movement in the Singh corps he had arranged that Colonel Amcer Khan's Nujeeb Regiment should possess themselves of the guns on the right flank (10) and the Mahomedan Regiment, Meei Jung Ah's, of those on the left (10), that on these regiments we might rely. I commended his zeal and requested him to keep a sharp lookout.

Last evening as my Head Moonshee was riding near the fort, passing some Akahes they opened out a volley of abuse on the "Feringhees" etc. I have desired him to point these men out the first opportunity, they are I suspect Dhurmuithies to a large amount, these I will confiscate if I get hold of them.

16th Mar.—Goomukh Singh, Commandant of Ghorechurras, appointed by the Durbai Governor of the Fort of Attock, started yesterday for his post, at his request I have allowed him to take five Ghorechurras and a personal Moonshee with him, subject to the Resident's approval. The post is an important one at all times and more especially now. I therefore deemed it expedient to comply with his reasonable request, and send him away pleased with me and himself.

Some Mahomedans complained last night that on the *Azan* being proclaimed two Ramgole sepoys abused them and said we will shortly teach you and the "Feringhees" to sing to another tune, etc. I directed Colonel Alla Singh to investigate the case and report the result.

We hear daily from Captain Abbott, who seems all right, he thinks many of his letters to Lahore are intercepted.

17th May.—After receiving the reports of the force had all the Commanding Officers up to pay their respects, talked to them for some time on Mooltan affairs, and told them to keep their eyes and ears open as to what went on among their men.

With Lieutenant Nicholson rode through the Ghorechurras' lines, the city and back by the Infantry Parades all appeared to be going on as usual

Under cover of giving ammunition to the troops raised for Bunnoo got seven maunds of powder and 30 000 musket balls into my house to be ready for any emergency

I have enlisted 200 men for my new regiment and 300 for Bunnoo

18th May 1848 — The force paraded for exercise on their respective parades

Sirdar Kwaja Mabomed Sultan Mahomed's eldest son, brought me a letter from Lieutenant Taylor of the 15th instant all well, but still disturbed by rumors of intended risings. He has given the young Sirdar 20 days leave.

Held my weekly Durbar of Urbobs, at which the affairs of Mooltan were freely discussed and the Durbar's recent Proclamation prohibiting, under pains and penalties, any of their subjects joining Moolraj. The Urbobs say a few Eusufzyes may be tempted to join his standard but no others from this quarter

On the breaking up of the Durbar almost all of the Urbobs had private audiences with me assuring me of their devotion, and that at any moment they and all their retainers were at my call. I applauded their loyalty and zeal and told them it should be remembered. One old Moollah of great repute told me his family consisted of 20 stout men, whom I might consider entirely my own.

Transacted business with Colonel Alla Singh, who brought me a letter from his father Sirdar Golab Singh, reporting his intended speedy departure to join me.

19th May — The weather has become so excessively hot that there is no pleasure in riding out morning or evening

A letter received last night from Captain Abbott mentions it had been reported that Goordut Singh a *Missul* of Ghorechurras, quartered at Puklee, had left their post and started for Mooltan

Two men of Adyzye the first march towards Kohaut, are said to have quarrelled about a bullock, drew their swords and killed each

other on the spot ; the friends of one on hearing of it attacked the family of the other and cut to pieces one woman and six men , it is bootless to try and seize these miscreants by any ordinary means, so I intend to watch my opportunity and *chhapaw* the village , it is said to be able to turn out 10,000 matchlocks, and from its vicinity to the hills is the refuge of all the bad characters of the district , the Sikhs hold it in great terror.

20th May 1848 —Sirdar Kahn Singh, Mujeetea, calling on me while receiving the reports of the troops, and most of the Commanding Officers being present, I took the opportunity to explain the contents of the Resident's letter, No 193 of the 15th instant, received last night, setting forth the proceedings in regard to the Queen-mother, etc., they all expressed their entire concurrence with the necessity which had arisen for her banishment from the Punjab and praised the forbearance which had hitherto been shown her and our present clemency

In connection with this subject I may as well record that, I am told, several people recently arrived from Lahore, talking about the execution of Colonel Kahn Singh, say that for the last month of his life not a day or night passed that he was not closeted for hours with Raja Shere Singh. It is a well known fact that during the Raja's government of this Province he employed Kahn Singh in most confidential matters , indeed on my arrival, with Goordut Singh, Mujeetea, he might be said to share its rule

Transacted business with Colonel Alla Singh. He has sentenced the two Ramgole sepoy mentioned in my Diary of the 16th as using seditious language, etc., to six months' imprisonment with hard labor in irons. I have given the like punishment to a Hindostanee sepoy of Colonel Ram Sahaie's Corps guilty of a similar crime

Hearing that Wuzer Khan, Commandant of the Attock Artillery, has a brother in a confidential situation with Dewan Moolraj, I have directed him to proceed forthwith to Lahore , it would not do to return him to Attock. I have promised that he shall have a fair hearing

Reports are very prevalent of Raja Golab Singh's being in daily correspondence with the Ameer Dost Mahomed Khan. I shall try and intercept some of the letters. He is likewise said to have emissaries about tampering with the Sikh troops , they would seem decidedly to look to him for countenance, if not support

I continue to receive most friendly messages from the Khyber Chiefs, but merely give them verbal complimentary replies.

All continues quiet here and throughout the Province, though the Eusufzye Chiefs are not paying their revenue, and I feel assured are watching our proceedings towards Mooltan most attentively. I hope to pay them off yet.

Geo St P LAWRENCE MAJOR,  
*Principal Asst to the Agent, G-G, N-W F*

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**No 21** —Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor-General, North West Frontier at Peshawur, from Sunday, the 21st, to Saturday, the 27th May 1848.

*21st May 1848* —The Ramgole levies (450) I have enlisted marched this mornlog under Dhurram Singh, Commandant, for Bunnoo each furnished with 20 rounds of ball ammunition.

Sirdar Sultan Mahomed Khan sends some horsemen to see them through the Kohaut district.

Heard from Captain Abbott, who, among other rumors mentions that of the Cashmere ruler being in daily correspondence with Amcer Dost Mahomed Khan.

*22nd May* —In consequence of the excessive heat, the troops paraded for inspection on their respective parades.

General Elabee Buksh with all the officers attended at my quarters after parade and paid their respects. I had the proclamation relative to the Queen mother's deportation read to them, they all expressed their entire approval of the measure.

Transacted revenue matters with Colonel Alla Singh, wrote to the Eusufzye Khans to send in their assets quickly to prevent the necessity of my employing troops which I would rather avoid.

An extensive robbery took place in the city last night, in the house of Bheem Sein Duftry. From the adjoining house a hole was made into the room in which the Duftry kept his valuables; his box was opened, and from it 3 000 rupees worth of ornaments extracted. Strange to say the under part containing money was untouched, the Police are at work, and I trust will succeed in finding out the perpetrator.

23<sup>rd</sup> May 1848.—All the Colonels attended with General Elahee Buksh to make their reports and *salams*.

Commenced the issue of four months' pay to the Ghorechurras under Sirdar Kaln Singh, an order having arrived from the Durbar on the treasury for 24,000 rupees to be disbursed on this account

Heard from Captain Abbott that Sirdar Gooidut Singh's *Missul*, reported to have left its post for Mooltan, had returned, pleading in excuse the orders of their Chief and want of funds

Yesterday was to have been our "Ides of March," the day named by Ramsay's Fakcer as the propitious one for the troops to rise! The tale must have been like most others we hear meant to alarm us merely. The 26<sup>th</sup> is the day Captain Abbott has heard named, it, I doubt not, will go off equally quietly.

24<sup>th</sup> May.—In my Diary of the 19<sup>th</sup> I noted the murder of a woman and several men at the village of Adzyze and of my intention to *chapaaw* it as the only means of securing the murderers.

For some days after the occurrence, the perpetrators had absconded, but finding no steps were taken against them they returned, and for three nights had small pickets thrown out to give intelligence of the approach of troops these were withdrawn on Monday night

At an hour's warning Lieutenant Nicholson marched last night with Uttu Singh's Sikh Regiment, Ram Sahare's Poorbeahs, and the Shere Dragoons, and 50 of the Jageer Horse, reached Adzyze at gun-fire, surrounded the village and secured the murderers with the Chief Mullik, and a quantity of arms, the surprise was so complete that no resistance was offered

At two hours before daybreak I detached Colonel Ruttun Singh's Sikh Regiment, and the Khas Dragoons, with 100 Ghorechurras, in support of the main body, not that I apprehended Lieutenant Nicholson had not force sufficient, but as a precautionary measure; I also deemed it a good opportunity to feel my troops

In all I succeeded to my utmost wish; the troops marched promptly and zealously, but Lieutenant Nicholson reports that the Sikh Regiment did not display their wonted activity in surrounding the village, while the Poorbeah Regiment exceeded his expectations

No 85 — Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor General, North West Frontier, at Peshawur, from Sunday, the 3rd, to Saturday the 9th September 1848.

3rd September 1848 — Ordered the Troops Regular Ramgole and Ghorechurras to parade to-morrow in Review order as much to test their feeling as anything else

Directed the relief of the Dragoons on post escort duty between this and Attock

The Governor and Deputy with several Colonels, were with me in the morning and evening At the latter visit the Durbar's purwannah was read complimenting the officers and men on their good conduct and the rewards that would be the result. I requested that the same should be made known to the men

4th September — It rained heavily last night so I countermanded the parade for this morning

The Governor and Deputy with all the officers were with me this morning I have confined a Subedar and six men returned from leave of several Corps who acknowledged to have passed 12 or 14 days in Chuttur Singh's camp They have evidently come primed to do mischief

Received a letter from Mr Ingram of the 1st from Nara contents made known to the Resident in my demi official of this date.

Sirdar Peer Mahomed Khan paid me a long visit this morning His alarm is almost as great as that of his brothers, he evidently thinks me insane for remaining in this position, so near to the cantonment.

I told him to leave one of his sons that he might witness the bearing of the officers and troops, in making their daily reports This he did and I think was comforted.

At the suggestion of the Governor and Sirdar Kahn Singh I have sent for Goormukh Singh Thannadar they deeming that it was better he was out of Attock for the present than remain there ranking under the supposed affront of the Nizamoodawla being joined with him in the Thannadarship

Received a long and interesting letter from Lieutenant Herbert, who I doubt not will get on well in his important charge.

Rode with Lieutenant Bowie and Colonel Alla Singh in the evening through the city, where all looked as usual

The reports continue of Sirdar Chuttur Singh's intended move on Huzara.

*5th September 1848* — Though the events of last night have already been reported to the Resident in my official of this date, still I may here give them a brief record

At 8 P.M. Colonel Alla Singh came to me in a state of breathless alarm, and said that he had it from good authority that the Residency was to be attacked by two or more Sikh Regiments during the night; that his troop of Artillery were first to be mustered, etc. Close upon him followed the Governor, more cool and collected. General Elahee Buksh of the Artillery, Colonels Meer Jung Ali and Ameer Khan, on whose corps the Governor said we might rely, were sent for, as likewise Colonels Mehtab and Ruttun Singh, who command the two Sikh Regiments in the Alli Muidan cantonment

The two first named Colonels were directed to get their corps under arms, and to detach a wing from each to take possession of the guns, which are on either flank of the cantonment, this they did quietly and promptly

The two Sikh Colonels declared that their men could not be in the plot as all were asleep, which proved to be the case. The Artillerymen were likewise found asleep, so that we had the agreeable assurance that the plot was not as yet general

It was said to have originated in Colonel Uttur Singh's Sikh Regiment, located a mile on the east of the city. Messengers returned from thence, and reported that that corps and the Khas Dragoons were getting under arms, and that an attempt had been made to possess themselves of Futteh Khan's and Tara Singh's guns (8) in that locality. Orders were sent to Colonel Ram Sahare Singh to send a wing of his regiment (Hindustanies) to protect them, which was done without opposition, and Afghan vedettes were placed from the city to the cantonment to give notice of any move in this direction

Our precautions evidently alarmed the ill-disposed, for the night wore on, and all remained quiet



At an early hour the Governor assembled all the officers and after giving them much good and sound advice sent them to ascertain the feelings of their men by troops and companies. Towards noon they returned and reported that the plot was originated by 40 or 50 men of different corps incited thereto by emissaries from Sirdar Chuttur Singh, but that they had failed in making any impression on the bulk of the men, and that all expressed themselves willing that those who might be proved guilty should meet their deserts.

I had summoned during the night the Barukzye Sirdars and Urbobs with their contingents. The former joined me at sunrise and the rest during the day.

Sirdar Kahn Singh declared that the Ghorechurras only heard of the occurrences in the morning. By his advice and that of Sirdar Golah Singh, I delayed bringing Futteh Khans and Tara Singhs guns from their cantonment for the present lest a collision might ensue.

I am of opinion that none of the officers were concerned, and that all are most anxious to preserve the peace.

Goormukh Singh, Thannadar of Attock arrived to-day pursuant to my summons. I gave him a khillut of five *parchas* and expressed my satisfaction of his conduct, more particularly on the day Lieutenant Nicholson entered the Fort and told him that his recall was merely a temporary measure. He seemed well pleased.

Received letters from Lieutenants Nicholson and Herbert all well with them.

6th September 1848.—The Governor, Deputy, and all the officers were with me. Two men of Colonel Mehtah Singhs regiment deserted during the night and two or three of Uttur Singhs regiment suspected of being engaged in inciting others have been put in irons.

I abstain from making much enquiry lest I should cause general alarm. My getting the guns I can see has had a great effect.

I have about 1500 Mahomedans at and about my grounds, but keep them as much out of sight as possible, and have directed the Barukzye contingents to return to the Wuzereeh Bagh.

The sepoy a Sikh who gave intelligence of the plot I presented with 50 rupees and promoted to Nalk.

We have had no daks from Lahore for several days, Chuttur Singh has evidently cut them off

Parades and drills are going on as usual except with the Artillery, who only give their horses walking exercise. I see the officers for the most part morning and evening, and to the Sikhs give every possible *tusully*, as they seem downcast

7th September 1848—Held my weekly Durbar of Urbobs, which was unusually crowded, all tendering unlimited service

The Governor and Deputy with all the officers were with me as usual. I have deemed it necessary for the present to put a stop to all leave of absence and to people crossing the Attock

Ram Dass, Duftry, said to have been seized by Sirdar Chuttur Singh, has arrived, and I am told that he spread the report merely to blind me, having, of his own accord, waited on the Sirdar and tendered obeisance. I have therefore suspended him and his son, Ajeet Singh, pending enquiry, it will be remembered that I have long expressed dissatisfaction with these functionaries

I have sent prisoners to Attock, the Subedars, Havildars, and four sepoy of different regiments returned from leave, who admit they passed 10 or 12 days in Chuttur Singh's camp; there is little doubt of their being emissaries empowered to work mischief

I hear daily from Lieutenant Herbert, who is making himself most useful in Attock

Lieutenant Nicholson reports having had another skirmish in the Margulla Pass, in which he lost six men killed and 18 wounded, and that he himself and Colonel Boodh Singh, Man, are among the latter, in the former are a Subedar and sepoy of my Levies, who are said to have behaved most gallantly. I have strongly advised him to avoid these collisions as much as possible, as he is not strong enough to succeed, better not try

I was warned to-day that it is intended to shoot the Governor and myself as the only means of winning over the troops; highly complimentary to us!

8th September—I sent an order this morning to Colonels Ruttun Singh, Kahn Singh, Rosa, and Uttur Singh, Man, to bring Futteh Khan's

and Tara Singh's guns to General Elahce Buksh's cantonment under escort of Ram Sahale Singh's Regiment which I am happy to say was done, without a sign of opposition from the Sikhs. We may now consider ourselves pretty secure, at least for the present.

I have intercepted a letter from Sirdar Chuttur Singh to Sirdar Sultan Mahomed calling upon him either to join him himself or to send one of his sons with troops, he states that he only waits for his arrival in Chuch to move on to attack Lahore, and that he is promised assistance from Maharaja Golsah Singh and the Sikh Force before Mooltan.

I had this letter conveyed secretly to Sultan Mahomed who received it with avidity asked many questions of the bearer, and told him to return in a day or two when he would give a verbal reply, it not being safe to write. This has disturbed me a good deal, for hitherto I had considered that whatever might be his inclinations, his interests bound him to us. He has recently assembled a large force at Kohat under the plea of repressing some riotous tenants this I have directed him to disband forthwith.

I find that three troops of Artillery are chiefly composed of Sikhs, I purpose drafting half of them into the Infantry and supplying their place with Mahomedans and Hindustanies. General Elahce Buksh and Colonel Alla Singh are anxious that this should be done.

*9th September 1848* — I yesterday morning walked down the front of the Infantry lines and inspected the guns in their three positions with the four companies of Infantry round each. Found all right. With Lieutenant Bowie rode through the city in the evening.

The Governor and all the officers attended my morning Kutcherry as usual as did Sirdars Kahn Singh and Peer Mahomed Khan Barukzye. After the passing of mutual compliments, the latter asked to speak to me alone, when he begged that I would not attend to any reports I might hear against him but believe that he was our most devoted. I repeatedly urged him to say why he deemed this caution necessary but could not get him to do so. There is evidently some mischief brewing, or why this anxiety to exonerate himself beforehand.

Intelligence from Cahul up to the 5th instant contains nothing worth recording, except the messenger declares the Ameer fired a salute on

hearing that the British officers had fled from hence to Attock, where they had been killed, and the fort taken by the Sikhs

The messenger who took Chuttur Singh's letter to Sirdar Sultan Mahomed says that the verbal answer was this "What you promised, you have not done; what I wanted you to do, you have not done, I told you to come here, where if the troops joined you we could soon settle matters our own way, and even if they did not, through the Sahib I could reconcile you to the Resident, this you have not done, therefore you and the Sahibs must settle matters as you best can; I'll have nothing to say to them"

Apparently all is quiet here

GEO ST P. LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G-G, N-W F.*

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**No. 36.—Political Diary of Major George St P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier at Peshawur, from Sunday, the 10th, to Saturday the 16th September 1848.**

*10th September 1848*—The Governor and Deputy with several Colonels were with me for some time to-day Discussing the probability of Raja Deena Nath being able to arrange matters with Sirdar Chuttur Singh, if an unconditional indemnity for the past (*sic*), all difficulty will be removed they think, but say, how can that be granted after what has occurred?

We have received for the last two days the Lahore posts *via* Pind Dadun Khan, so are in hopes that they will now arrive regularly; from what I can learn all our daks since the 28th have been cut off

Lieutenant Herbert reports all right at Attock, and that Lieutenant Nicholson had proceeded to Huzara to assist Captain Abbott in opposing Sirdar Chuttur Singh, who was about to endeavour to extricate the garrisons of Huiripore and Gundeia

*11th September*—The troops were inspected on their respective parades by Commanding Officers

The Governor and Deputy with all the Colonels attended with the daily report of the force in the morning and most of them were again with me in the evening they seem to think they cannot come too often, and though it interferes with business I like not to object

*12th September 1848*—Rode down the parade this morning, and saw Colonel Mehtab Singh's Regiment go through six or seven evolutions in the English mode which they performed very creditably but not with the spirit they did when last I looked at them the men held down their heads as if ashamed of themselves

The Governor and Deputy with the Colonels and Commandants were with me as usual. A rumour has got abroad that the advanced tents of a British Brigade had reached the Jhelum would to God it was true! I said to the officers that I had not heard of it but that if not there now I trusted they shortly would and then they would rejoice in their good conduct and loyalty

My eyes are troubling me so much that I have been obliged to put myself into Mr Thompson's hands for treatment and I regret to say Lieutenant Bowie is again laid up with fever so that we are rather an invalid pair

Lieutenant Herbert writes that he considers 200 more men are necessary for the garrison of Attock

*13th September*—The Governor and Deputy with Sirdar Kahn Singh Majeeta and most of the officers were with me this morning, and several again in the evening

Accounts arrived from Lieutenant Nicholson of his Levies, and those of Captain Abbott having been defeated in the strongest pass in Huzara by Sirdar Chuttur Singh's troops 200 Eusufzyes and Peshawarees are described as to have been the cause from their flying from the centre of the line ere a shot was fired. Captain Abbott's men are said not to have appeared at all. These are the wretched materials these officers have been relying upon wonderful that they escaped with their lives. The Gundeia Brigade having thus been liberated have joined the Sirdar whose force now consists of 14 guns, and six regiments of Infantry exclusive of Cavalry and people of the country, or Moolkias.

He gives out that he purposes marching on Lahore, but I am quite sure has no such intention; he will either invest Attock or take this direction.

I have sent 240 Pathans as reinforcement to Lieutenant Herbert, under command of Syed Ayaoodeen, our pensioner, and have ordered all the boats, but two, to be sent down the river to Futteh Khan, Tiwanah, to assist in conveying grain to Mooltan, and to get them out of the way of the Sirdar and his rebel troops.

Received an official reply, dated the 8th instant, from the Resident to my application of the 1st and 2nd for British Troops, from which I learn that the Jullunder Brigade is ordered to hold itself in readiness to move at the shortest notice, and that a Light Brigade was preparing at Lahore to join it, on reaching Goojranwalla. The Resident's demi-official says, "We shall be strong in troops here in the course of a few weeks" ! Poor comfort to us, who require them now. Where shall we be in a few weeks !

We have received the daks pretty regularly for some days *vid* Pind Dadun Khan

*14th September 1848*—Held my weekly Durbar of Urbobs. They have heard of the bad conduct of their men with Lieutenant Nicholson, but appear to think little of it, they are not meant to cope with Regular Troops they say. I am pretty confident that not a man of them is to be depended upon.

The Governor and Deputy, with the Colonels, attend as usual. The former says he expects nothing from the deputation of Raja Deena Nath, who is said to have arrived at Rawul Pindiee for the purpose of negotiating with Sirdar Chuttur Singh and the rebel troops.

I have written officially to Captain Abbott and Lieutenant Nicholson directing them to throw themselves with their establishments into the Fort of Attock, it being impossible they could do anything more in Huzara, and it being most likely that Chuttur Singh would lose no time in investing it.

*15th September*.—I have carried out my intention of drafting a portion of Sikhs, from three troops of Artillery where they preponderate, into the Infantry, and supplying their places by Mahomedans

and Hindustanies. This morning I paraded 90 of them, and, after explaining that their removal was merely a matter of expediency not caused by any misdemeanor, allotted them to the Sikh Corps. One only applied for his discharge which I granted at once

This measure is decidedly unpopular, but it is necessary and hence I take the risk; these are not times to stand on trifles

All the regiments paraded for exercise on their respective parades. The state of my eyes prevented my seeing them, I am ordered not to expose them to the sun.

After consulting the Governor, Sirdar Golab Singh, I have directed the Barukzye Sirdars to proceed with all the men they can collect, and oppose Chuttur Singh across the Indus. It is not unlikely that they may join his standard, if they do their jageers will aid the embarrassed exchequer, and at any rate it is better to have them as open foes than doubtful friends!

There are rumors that the Ameer of Cabul intends availing himself of the present disturbed state of affairs to make an effort for the recovery of this Province, but I do not credit them. Whatever his inclinations may be he has too much sense to come again into collision with us. It however is true that he has of late been paying more attention to the muster and payment of his troops than hitherto, which may have given rise to the reports

Received a note from Mr Cocks of the 11th instant, up to which date no troops had moved from Jullunder or Lahore for this quarter. The old Governor can't make it out at all

*16th September 1848*—The Governor with all the Colonels and Commandants waited on me as usual both in the morning and evening

I have directed Lieutenant Herbert to keep only three boats at Attock and to send all the rest to Futteh Khan, Tiwanah, to load with grain and send to Mooltan. It will keep them out of the hands of Chuttur Singh, who will be considerably puzzled to transport his troops to this side of the river, should it be his intention to do so, my regiments too will see that (*sic*).

By way of showing the Sikhs that I have not lost confidence in them I have got a company of Ruttun Singh's regiment on duty at my resi-

dence, who furnish the sentries on the treasure and dwelling house. It is doubtless running a risk, but I think a necessary one, and will have a good effect.

The district is perfectly quiet, and I never had my orders more promptly or zealously executed.

From Cabul I have no recent intelligence, though the rumors still prevail that the Ameers meditates taking advantage of the state and feeling of the Sikh army. I however believe it not, and sleep quite comfortably.

GEO. ST. P. LAWRENCE, MAJOR,  
*Principal Asst. to the Agent, G.-G., N.-W. F.*

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**No 37.**—Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 17th, to Saturday, the 23rd September 1848.

*17th September 1848*—The Governor and Deputy with all the Colonels were with me as usual. Purwannas from the Durbar arrived to the Governor and officers approving of their conduct, these I have ordered to be read to their men on parade to-morrow.

I have countermanded the march of the Barukzye Sudars, finding they really had no troops on whom they could depend.

*18th September*—The troops paraded for inspection in their respective cantonments, when the Durbar's purwannas were read to them, in presence of the Governor, all seemed much pleased and expressed their devotion to the State.

The Governor and officers, after the parade, paid their respects, and while sitting with me the post brought the Resident's letters of approval of the conduct of the force, which appeared to gratify them much.

Lieutenant Herbert reports a melancholy accident, with loss of life of 14 men, on the river Attock, one a Sergeant of the Sapper and Miner Corps. It seems he was sent with 4 or 5 Sappers and 60 Pathans by Captain Abbott to the Fort of Attock; the boat struck on the rocks and foundered; the Sergeant was taken up to the Fort, but the vital spark had fled.



*19th September 1848*—With Lieutenant Bowie I rode to Suchet Singh a cantonment and through the lines of the Khas Dragoons and Uttur Singh's Sikh Regiment.

The Governor and officers were with me as usual. Shortly after they left, the Lahore post brought a letter from the Resident giving an account of a victory gained by our troops over the Mooltan rebels and a purwanna from the Durbar directing a Royal Salute to be fired, which I had done from three posts—the Cantonment Fort, and Gor Khuttry—and directed the cause to be explained to the troops.

Some of the townspeople wished to illuminate but I told them to wait till the victory was complete by the fall of the city and fort which might now be shortly expected.

*20th September*—Rode through the city and round by the cantonments; saw the Sher Dragoons at exercise.

Lieutenant Bowie visited the fort to serve out ordnance stores.

My eyes were so bad to day that I was obliged to get Lieutenant Bowie to write my letters, riding in the morning did them no good.

A note from the Resident mentions that Chuttur Singh's younger sons Autar and Tej Singh, were expected at Lahore not at all likely!

I have received an answer from Raja Deena Nath to my two letters. He says he finds his deputation to be a failure, that Sirdar Chuttur Singh has no idea whatever of coming in, he therefore wishes to know what I would recommend his doing to which I replied either join Lieutenant Nicholson or return to Lahore.

I have directed Lieutenant Herbert to pass on 400 or 500 leave of absence men who have been detained for some time at Rawul Pindie, and are said to have been bought over. Though this is not unlikely still I think it better they should join, for were I to prevent them, they would of course consider they were at liberty to offer their services to the Sirdar and their brethren here would have good grounds of complaint against me. Of the two evils therefore, I think I have chosen the least.

The Governor and all the officers were with me as usual morning and evening.

*21st September 1848*—Rode through the city in the morning and home by the parades, where I found the drills going on as of old

Held my weekly Durbar of Uibobs, at which the Governor, Sirdar Kahn Singh, and all the officers attended

I find I have omitted to mention that on the 19th, pursuant to the Resident's and Durbar's orders, I caused Royal Salutes to be fired from the Cantonment, the Fort, and Gori Khuttry, in honor of the victory gained at Mooltan by our troops over the rebels

Sent 100 Barukzye Horse, under one of Sultan Mahomed's sons, to reinforce Lieutenant Nicholson.

*22nd September*—The Officers and Governor attended as usual

Received intelligence from Mr. Inglis of the defection of Raja Shere Sing and the Sikh Sirdars, directed the Dak Moonshee to keep back all letters for some days

The Lahore Akhbar contains a full account of it, this too, I have suppressed, only telling the Governor and his son the news. Though startling, it has in no way surprised us, for we have long expected some such, and the only wonder is that it did not occur before

I start Mrs Lawrence and the children to-night under a strong Afghan escort, for Lahore, *via* Kohat and Ghebe. Sirdar Sultan Mahomed sees her across the Indus, and thence his eldest son, "Kwaja Mahomed," proceeds on with her, he rejoining me, during his absence his son "Zukereea Khan" remains as a hostage with me.

Sirdar Golab Singh begs me strongly to urge on the Resident the expediency of not only immediately confiscating all the estates, jageers, and property of the rebel Sirdars, but the seizure and imprisonment of their families, half measures, he says, will no longer do

*23rd September*—My family started last night with Sirdar Sultan Mahomed and a large escort, their departure caused a great stir in the city, the ill-disposed giving out that Lieutenant Bowie and I had likewise gone. To counteract this, we rode through the chief streets, and on to Suchet Singh's cantonment; it was amusing to see how we were stared at

Mrs Thompson, not being in travelling condition, did not accompany my wife.

The Governor and all the officers with many Urboba were with me as usual, the latter volunteering service.

Received a letter of 17th instant from Lieutenant Taylor in which he gives an account of the defection of the Sikhs and of his having been directed to join Lieutenant Edwards decidedly a judicious move.

The necessity of raising the siege of Mooltan, and the continued delay in troops advancing on this quarter is likely to damage us much.

Our prospects of keeping this force in hand mainly depend on the movements of Sirdar Chuttur Singh. Should he invest Attock or cross the river, it is impossible to hope the Sikh Regiments will stand fast but should he proceed towards Mooltan or Lahore we may possibly for some time longer keep them to their allegiance.

Colonel Ameer Khan tells me that his Regiment (Nujcebs), express themselves much hurt at my sending my family away, as it evinced want of confidence in them, to which I replied that he might assure them that my motive was to render myself unshackled, so that I might stick to them as long as they stuck to me.

A news-letter from Cahul to the 18th instant contains nothing beyond the reported destruction of 400 Hazelbash Horse and Foot in the Hazara country where they were collecting revenue. They had incautiously separated into small parties which were attacked by the people, and all cut to pieces only ten men escaping to tell the tale. The Ameer is represented as determined to bitterly avenge them without delay and was collecting every disposable man to send to Bamian for that purpose.

GEO ST P LAWRENCE, MAJOR,  
*Principal Asst to the Agent G G, N W F*

No 38.—Political Diary of Major George St P Lawrenoe, Principal Assistant to the Agent to the Governor General, North West Frontier at Peshawur, from Sunday, the 24th, to Saturday the 30th September 1848.

24th September 1848.—With Lieutenant Bowie rode through the city in the morning and evening to show ourselves as it was industriously given out by the ill-disposed that we had fled to Attock.

Last night a sepoy of Ram Sahai's Nujeebs was murdered within 100 yards of my compound and of then Standard guard, it seems he left his guard two hours before daybreak, and was performing the offices of nature, when he was cut down, he must have badly wounded one of his assailants, for I traced the blood for a mile in the direction of the village of Nuttch. I offered a reward of 100 rupees for the apprehension, on conviction of the murderers (*sic*), for several must have been concerned.

Received a letter of the 20th instant from the Resident, from which I regret to see that it will still be a long time before we may hope to see British Troops cross the Jhelum.

25th September 1848 — The troops paraded on their respective parades. I deemed it prudent not to have a general parade, from the necessity of protecting the guns, over which I still keep 12 companies of Infantry.

With Lieutenant Bowie I rode down the lines and home through the city. The artillery horses were out at skeleton drill.

The Governor and all the officers attended as usual to pay their respects and make their reports.

Sudar Zukreea Khan, son of Sultan Mahomed Khan, has taken up his residence in my grounds considering himself as a hostage for the safe arrival of my family at Lahore, he is a smart, intelligent young man.

I am rejoiced to hear from Mr Inglis that the Fort of Govindghur is garrisoned by British Troops. The old Governor some time since told me to strongly urge its immediate occupation on the Resident, it would seem we have not been a bit too soon about it, this will be a considerable damper to the rebel cause.

The company on duty at my quarters from Colonel Ruttun Singh's Regiment has been relieved by one from Mehtab Singh's (Sikh) Corps.

26th September — Rode with Lieutenant Bowie through the city morning and evening.

The Governor and all the officers with Sudar Kahn Singh, Mujeetea, were with me as usual, last evening and this morning. I caused to be read to them three Robakaices from the Resident in the matter of the defection of Raja Shere Singh and the force under his command. They

exhibited no surprise, and judging by their countenances it seemed to make no impression on them the Rnbakaree announcing that the posts of the rebel officers should be filled up by the promotion of those who remained staunch gave evident satisfaction

I have commenced the issue of pay to the leave-of absence men taking a corps each morning this will occupy eight or ten days. I will then disburse to the troops by wings so that ere many have been paid we shall be able to see what Chuttur Singh's plans are and the troops will know that all will get in time

I sent Colonel Alla Singh to Sirdar Peer Mahomed in the Doaba to commit to his charge all the boats on the Lundee or Cabul river so as to prevent their falling into the hands of the enemy the Sirdar readily undertook the charge and has secured them effectually

*27th September 1848*—With Lieutenant Bowie I rode to the fort to serve out powder and lead to send to Captain Abbott in Huzara

The Governor and all the officers were with me morning and evening The Proclamation of the Durbar confiscating the estates of the rebel Sirdars seems to have disturbed them much as each have relatives among them

Reports are rife that the troops at Bunnoo have murdered Futteh Khan Tiwanah and Colonel John Holmes The dak from that quarter has been stopped for some days but I can't place credence in the rumors which have been doubtless spread by some sowars of Sirdar Syed Mahomed Khan who have recently returned from Mooltan, whether with leave or without I can't ascertain they having brought me no letter Sirdar Sultan Mahomed is said to have stopped many of them at Kobaut.

Lieutenant Nicholson writes that Chuttur Singh's son Autar Singh had met with a repulse at the village of Sandpore where he had endeavoured to make collections many of his people were killed and he forced to fly A few such affairs would damage his cause greatly

*28th September*—With Lieutenant Bowie rode through the city to the parade ground of Suchet Singh's cantonment, on which I found Colonel Uttur Singh's Regiment of Infantry and the two Dragoon Corps at exercise. I saw each go through several manœuvres which they did

very creditably I rode in among the ranks of the Cavalry several times to put them right, which seemed to amuse them; it shows that at any rate they have no designs against me for they might have easily captured me.

Held my weekly Durbar of Urbobs and gentry, which was numerously attended, the Governor and all the officers being present

I have received offers of assistance in men from several Khyber Chiefs, which I have declined

29th September 1848.—With Lieutenant Bowie rode through the city A disturbance took place during the night among some of the Khut-ties in which one of the Thannadars was struck. I caused 15 of the principal men engaged in it to be seized, and fined them pretty severely; they are evidently bitten by the revolutionary mania.

Colonels Bhaug Singh and Uttur Singh, Man, brought me a letter from their relative Colonel Bhoop Singh, in which he says that he is most anxious to join me with four or five officers, if I can give him a promise of indemnity for the past, that he had been forced into rebellion by the troops instigated by Colonels Bahadoor Singh and Richpaul Singh Considering it of first-rate importance to break the rebel ranks, and that the arrival of so many officers would have a good effect on my own force, I hesitated not at once to give a promise of pardon to all who might come in, provided they had not been accessories to the murder of Commandant Canara

Lieutenant Nicholson has long urged me to send him a troop of Artillery to strengthen Attock, but considering that in the present feverish state of the troops the despatch of guns might bring on a collision, which hitherto has been happily avoided, I declined. The Governor however telling me to-day that I might do so without danger, I have ordered off Futteh Khan's troop, all Mahomedans, with five guns, they start at 2 A.M. under escort of two companies of Ram Sahare's and two of Mahomedan Ramgoles, with 100 Khyberees General Elahee Buksh and Colonel Ruttun Singh will accompany them six or seven miles, and see them well past Uttur Singh's Sikh Regiment, which is the most doubtful of all my force It will be a good test if they stand it; however, nothing risk, nothing gain is my motto

30th September 1848—I am happy in being able to record that the troops marched as directed without the slightest opposition, though it must have been very galling to the Sikhs to see them pass, knowing they were to be used against their countrymen. The old Governor I find went a considerable distance with them. This troops march is a gratifying proof that whatever their inclinations may be I have still the soldiery in hand and if our troops are only moved up to the Jhelum within the next 20 days this fine force of nearly 9 000 men, with 30 guns and no less than nine forts may be held to their allegiance, no inconsiderable matter I should think when it is considered that these are by far the best disciplined and appointed troops in the Khalsa army.

The Governor and officers were with me as usual. General Elabee Bukeb and Colonel Ruttun Singh returned at 10 A.M. I must say that all the officers appear most anxious to keep their troops to their allegiance. To encourage them in doing this I have told them that I would beg the Resident to suspend for one month proceeding against the families of their next of kin who have joined the rebel cause to give them time to recall them to their duty. They naturally say if their sons and brothers wives etc. are disgraced, the shame falls equally on them, and if so, what object have they in remaining staunch.

I have no intelligence from the west. Sirdar Sultan Mahomed Khan is trying hard to get my sanction to his remaining at Kobaut, with the ostensible view of coercing the people of Illaqua Tehree but I have told him that he must postpone this to a more propitious season, that just now he must remain with me.

GEO ST P LAWRENCE, MAJOR

*Principal Asst to the Agent G G, N W F*

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No 39 —Political Diary of Major George St. P Lawrence, Principal Assistant to the Agent to the Governor General, North West Frontier at Peshawur, from Sunday the 8th, to Saturday the 14th October 1848.

8th October 1848 —Paragraphs 1st, 2nd 3rd and 4th—Destroyed and effaced

9th October —Last evening the Governor sent to me to say that it would be better to countermand the parade for to-morrow, as he had

heard that some of the regiments intended to take the opportunity to make a rush upon the guns, the orders were accordingly issued.

Three troops of Artillery received pay this morning, there is a good deal of talk among the men as to my doing it forth so leisurely; some say it is on account of the proximity of Chuttur Singh, others that Hoondies from Lahore having failed to arrive I am trying to raise cash in the bazar; at any rate, say they, we shall get it in the long run, which the troops on the other side of the water can't expect to do.

Lieutenant Bowie rode to the Gori Khutti and Fort to serve out ammunition and stores

Letters from Chuttur Singh to the officers calling on them to join him arrive hourly. General Elahie Buksh sent me one just now to his address and that of Colonels Meer Khan and Meer Jung Ali, the messenger I have confined and feel disposed to make an example of, but am deterred lest it should prevent others being sent me.

Colonels Kalin Singh and Uttin Singh have accounted for their absence from my Durbar on Saturday evening on the plea of being intoxicated and the former looks as if he had been drinking hard. I have given them their khilluts, though they little deserve them. Uttin Singh read me the answer he has received from Colonel Bhoop Singh, which is that as Chuttur Singh intends to march on Peshawur it would be better he should remain with him for the present, the fact of \*

he expects in the next 10 or 15 days \*

are in motion or not \* Reports are abroad that Lieutenant Nicholson is gone to Lahore. I trust it is so, for we are anxious about him, not having had a line since the 1st. The Governor, Deputy and all the Colonels were with me this morning with the daily reports and in my room attached their seals to a letter to Sirdar Chuttur Singh telling him that if he could produce to them Dhuleep Singh's or the Durbar's warrant for his proceedings, or if he would go and possess himself of Lahore and Umritsur, that they would hold this Province for the Sirkar, but that to give up to the Mahomedans what had cost the Khalsas so much blood and treasure merely on his bare word they would on no account do. Sirdar Kahn Singh and all the Ghorechurra officers with the Barukzye Sirdars added their seals, we shall see what the reply will be.

*10th October 1848.*—We took our usual ride this morning



The Governor, Deputy and all the Officers attended with the usual reports

3rd paragraph—Destroyed and effaced

*11th October 1848* — Last night the Governor awoke me to tell me that it had been reported to him that Mehtab Singh's regiment intended to march during the night all were on the alert for some hours, but it turned out a false alarm. In the morning the Colonel and all the Subedars waited on me and complained indignantly at the report against the regiment, requesting that the man who told the Governor should be punished. I applauded their just indignation and said investigation should be made.

The Governor Deputy and most of the Colonels attended. Kahn Singh, Rosa, of the Khas Dragoons is again recusant, saying he is afraid to attend my Durbar lest I should imprison him. The Governor still advises me not to appear to notice it, which goes much against the grain.

We have had no accounts of or from Lieutenant Nicholson which rather alarms us. He was last heard of near Pind Dadun Khan.

The boats on the Lundee or Cabul river I have had collected and placed under charge of Sirdar Peer Mahomed, whom I hold responsible for their safe keeping. Sent my Head Moonshee out this morning to see that he was present and had a good guard over them, for Chuttur Singh would give much to get hold of them. The Moonshee reports that they are all right, but rather loosely guarded.

*12th October* — Held my weekly Durbar of Urhoba and officers. Reports are rife of our troops having marched from Lahore towards the Jhelum, and it is said to have caused the rebels to move their camp from Shumshabad towards Huzroo. Autar Singh writes to his father not to waste his time on the Indus but to make the best of his way towards Lahore. Colonel Alla Singh tells me to mention to the Resident to have a good watch kept at Jullunder on the Sodees that Baba Bickram Singh will do all the mischief he can. It is already reported here that he is up in arms and defeated our troops. The latter report is false.

3rd paragraph—Destroyed and effaced

*13th October 1848* — 1st and 2nd paragraphs—Destroyed and effaced

It is with deep regret I have to record the murder at Bunnoo of Futteh Khan, Tiwanah, which is reported to have occurred eight days after that of Colonel Holmes. For half that period they got a scanty supply of water, which failing, the men with him in twos and threes let themselves down by ropes among the Sikh troops, who merely disarmed them, last of all Futteh Khan followed, but with three or four of his followers was immediately cut to pieces. Fortunately his son had proceeded a short time previously to join Lieutenant Nicholson with some horse, and so has escaped. The force is said to be still at Bunnoo and undecided whether to move towards Mooltan or Attock, they have sent parties to bring in the treasure from Lukkee, which had arrived for the pay, and to Esa Khail to take possession of the boats and grain collected there by the poor Khan.

*14th October 1848*—I have not ridden out for a day or two in consequence of hearing that it was plotted by some of the Colonels to waylay and either seize or murder us. As the execution of such a plot would naturally create a riot, I deemed it as well to keep to the Residency grounds.

The Governor and several of the officers attended as usual; the absentees are the disaffected. The Governor still advises biding our time in regard to them, which I have agreed to do though not in accordance with my own views. He tells me that Chuttur Singh has sent his sword and head-dress to Sirdar Kahn Singh, Majeeta, invoking him by them and all he holds sacred to join his cause. The Sirdar asked what he should do. "Give him a direct refusal," replied Pohvindea, "for is not his weakness apparent when he is so abject in thus applying?" This was accordingly done.

I have no recent news from the west.

GEO ST P. LAWRENCE, MAJOR,  
*Principal Asst to the Agent, G-G, N-W. F*

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**No. 40.**—Political Diary of Major George St. P. Lawrence, Principal Assistant to the Agent to the Governor-General, North-West Frontier, at Peshawur, from Sunday, the 15th, to Saturday, the 21st October 1848.

*15th October 1848*—The Governor with a few of the Colonels waited on me with the daily reports.

I regret to record that it is bruited abroad that I cannot depend on the Mussulman or Nujeeb Corps, for that, should the Sikhs attempt to take the guns, they will not oppose them, this is a bad look out still I will not despair and give them a trial at any rate

16th October 1848 — The troops were inspected on their respective parades by their Colonels the Cavalry and Artillery dismounted

The Governor Deputy with Sirdar Kahn Singh and all the Colonels but Kahn Sing Rosa waited on me with the daily reports Alla Singh mentions that Colonels Mehtab Singh Ram Singh, Kahn Singh Rosa and Bhaug Singh are conspiring together for mischief Ram Singh is my Tahaeeldar and lives in the Gor Khuttry I have ordered him to change quarters into my compound and have had the treasure chest moved into the fort.

Despatched a Havildar of Ruttun Singh's Corps as a *cossid* with letters to the Resident he promises to reach in six days and return in a like number I once more represented the necessity for the advance of our troops if it was considered desirable that this force should continue in allegiance

The Khas Dragoons and Uttur Singh's Regiment are reported to have packed up and got rid of their extra *atta* ready to move to night, that Chuttur Singh wrote them till they made one march he would not believe they intended to join him the Governor has sent for the Colonels to talk to them

17th October — Lieutenant Bowle rode to Suchet Singh a cantonment and found Uttur Singh a regiment at exercise saw them go through some manœuvres, the order for march seems to have been postponed Colonels Mehtab Singh Uttur Singh and Bhaug Singh last night took their oaths before the Governor that they would prove faithful

Colonel Alla Singh brought Kahn Singh, Rosa to me, who says that his only reason for absenting himself arose from fear he is of course aware that his evil designs are known, and therefore dreads my seizing him

The Governor and officers were with me morning and evening as usual the former with Sirdar Kahn Singh has written to Sirdar Chuttur Singh that he need not think to get this force to join him, so that he is only losing his time in waiting We have arranged that the Colonels shall daily write in pairs similar letters

Sirdar Sultan Mahomed Khan being slow in furnishing the Horse and Foot I ordered, I sent my Moonshee to tell him that he would only injure himself by so acting, that he must either be with me or against me, no middle course would do, and that he must not fancy I should, in acting, take into any consideration his having my family in his hands, that I should do my duty in all respects, without reference to them

*18th October 1848* — Lieutenant Bowie rode to the fort and through the city.

Colonel Ruttun Singh's Sikh Regiment were paid yesterday and to-day. I took the opportunity to explain to them that up to the present I was well pleased with them, and that if they continued thus true to their salt, they should benefit by the promotions consequent on the misconduct of the other corps

An answer has arrived from Sirdar Chuttur Singh to the letter from the Sirdar and officers, in it he takes no notice of their demand for a sight of his orders from the Maharaja for the nature of his present proceedings, etc., but says what he is doing is for their religion, that if they have any regard for it, or for the Khalsa salt they have so long eaten, they should show it by joining him

The Bunnoo troops are said to be directed to march on Wuzeerabad, where the rebels purpose concentrating their forces. I have written to Colonel Bishen Singh, Raja Tej Singh's relative, that if he likes to separate his regiment (Mahomedans) from the rest and join me, I shall be happy to receive him

*19th October* — I am trying to drill 200 Afghan horse that I have enlisted as a personal escort, my Pathan Regiment, five companies of which are here and three at Attock, are getting on well. In addition to them I have assembled about 2,000 matchlockmen exclusive of those the Barukzyes may bring. I should like to get the guns into my compound, but this the Governor objects to, saying it would disgust the regiments in charge of them

Held my weekly Durbar of Urbobs and gentry, which is now a matter of form, as they all come to my daily Durbar. They seem most anxious to please me, but I can see have little confidence in their people being able to oppose the Sikhs, their hourly enquiry is, "why do not your troops advance?"

Yesterday we were delighted at the arrival of four daks from Lahore thinking that they would give us the long hoped for intelligence of the advance. Our disappointment was bitter on reading a note from the Resident full of sympathy and anxiety for us, but saying 'I am powerless to send troops. Why he should be so we cannot understand, with the army that now is at Lahore Ferozepoor and its vicinity. I find it most difficult to reply to the Governor's anxious enquiries as to when he may hope for aid from our Government. he evidently begins to look upon himself as sacrificed. The gloomiest day has some light hearing from Mr Inglis that Lieutenant Nicholson had reached Ramnugger *en route* to Lahore, gave us a gleam of hope, as we trust that his representations will do what all our writing has failed in doing *i.e.* cause a speedy advance of British Troops for no one can know better than he the absolute necessity of it.

I hear that the Sikh Regiments have resolved on starting to join Chuttur Singh as soon as Uttur Singh's Corps have received their pay they seem not to consider how they can cross the Indus without boats or rafts. I understand they are to take me with them if they can, and have made the Sirdar promise not only not to injure but to cause me to be conveyed to Lahore.

20th October 1848—The Governor and all the officers waited on me with the daily reports, the disaffected Colonels among the number. Hearing that one of them had ridden to the Cabul river to look for a ford, I have written to Sirdar Peer Mahomed Khan to have the boats removed higher up the river to a point where the Sikhs will be afraid to go after them.

Lieutenant Herbert writes from Attock that he hears the rebel force under Chuttur Singh attacked the previous day Captain Abbott's position at Nara, and were repulsed with considerable loss, if this be true it may be of use to us.

I am now issuing the pay to two companies daily to make it last longer this of course is not pleasing to the men, but 'tis necessary. Hearing that a Sikh calling himself a disciple of Bhaie Maharaj had arrived with a warrant calling on all good Sikhs to attend to his summons and that he was located in Uttur Singh's lines, I directed the Governor either to have him seized or turned out. he was lodged in the fort during the night but as yet I have not been able to get the warrant which, of course, is a forgery.

21st October 1848.—Lieutenant Bowie rode to the fort to serve out stores, and my Moonshee took out my escort to drill.

The Governor and Deputy with Sirdar Kahn Singh and most of the Colonels waited on me as usual with the daily reports. Colonel Kahn Singh, Rosa, was absent

Sirdar Peer Mahomed Khan reports having moved the boats as directed.

I completed this morning the issue of pay to Mehtab Singh's Regiment.

At my evening Durbar I held out hopes of being able to get by Hoondie pay for the troops for the two months already due, which would be in process of issue ere long I also said that if any corps mutinied I should hold the officers answerable, as till they gave the impulse, the men I knew would not move; this caused some of the Colonels to look rather blue.

As Sirdar Sultan Mahomed had not been near me for some time I sent for him; he is as full of professions as ever, but their sincerity I greatly doubt, and am sure that if Chuttur Singh crossed the river he would join him I took the opportunity of his being with me to muster my levies to the amount of 2,600 men, so that he might see I was independent of his aid! I fancy he thinks he has me entirely in his power in having my family, but I hope to show him his mistake ere long

I am happy here in being able to record that though the 2,600 men now living in my compound are from all the tribes, many deadly enemies of each other, not a theft or brawl has occurred, a thing quite unprecedented in the annals of Peshawur. I have men from the Khyber, Afreedees, Ourakzyes, Janakorees, Kohauttees, Momunds, Khulleels, Daoudzyes, Kuttuckees, Eusufyes and even to Swat and Boonayr The Urbobs declare they should have thought it impossible that I could so have got the better of them, for the first night or two they screamed and yelled as is their custom in war, but ceased immediately I ordered them; the Sikhs cannot understand it

The district is perfectly tranquil, from 2,000 to 3,000 Eusufzyes under their Khans are watching the movements of the rebels on the

opposite side of the river, in conjunction with Colonel Dhun Raj and three companies of Ramgoles. The Bunnoo force is said to be marching on Wuzeerahad. I am sure I hope so, and wish Chuttur Singh would do the same.

GEO ST P LAWRENCE MAJOR,  
Principal Asst to the Agent G G, N W F

*Names of Sikh Officers in the Peshawur Regiments which mutinied on  
the 23rd October 1848*

|                                            |   |                |
|--------------------------------------------|---|----------------|
| Colonel Kahn Singh Rosa and son,           | } | Khas Dragoons. |
| Commandant Sahib Singh, Poola              |   |                |
| ,    Mirza Rahmutoola Putta,               |   |                |
| Adjutant Ruttun Singh, Kihava              |   |                |
| Major Jowahir Singh,                       | } | Shere Dragoons |
| Colonel Bhaug Singh Man,                   |   |                |
| Commandant Thakoor Singh Seraia            |   |                |
| Gopal Singh, Jummoo                        |   |                |
| Adjutant Jode Singh,                       | } |                |
| Futteh Singh Kang                          |   |                |
| Major Ummur Singh.                         |   |                |
| Colonel Mehtah Singh Moraria.              |   |                |
| Commandant Ram Singh                       |   |                |
| "    Bugwan Singh Jubel                    |   |                |
| Adjutant Julla Singh Jumshere.             |   |                |
| Colonel Ruttun Singh Man, with me.         |   |                |
| Commandant Lehna Singh his son not with me |   |                |
| Adjutant Soojan Singh Baporaria.           |   |                |
| Colonel Uttur Singh, Man                   |   |                |
| Commandant Gehar Singh Doaba               |   |                |
| Assah Singh Pudree                         |   |                |

Adjutant Pertab Singh Man, Bhang Singh's son Ramgole Adjutant Heera Singh Doaba Ghorechurra Rumma Singh, Bahadoornuggur, all his *Missul*.

All the families should be at once seized, Jagteers confiscated

GEO. ST P LAWRENCE MAJOR  
Principal Asst to the Agent, G G, N W F

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Tara Singh to Colonel Umeer Chund I was always opposed to the transfer of Umeer Chund to Tara Singh's *Topekhanah*. The men of the battery have a kind of feud with him and the establishments which in his own *Topekhanah* he had been labouring to get into order have been replaced by the rotten carriages of another battery. My views however, were overruled my orders cancelled and the immediate consequence was the disaffection of the *Topekhanah* at Karoo khowta, a matter still under investigation. I have issued purwanas to the Kardars to procure mules or camels in exchange for the carts but delay seems to be inevitable.

J ABBOTT

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No. 16 — Diary of Captain James Abbott Assistant Resident, on deputation to Huzara, for the 8th May 1848.

8th May 1848—Hurripoor, Huzara—All the Chiefs to whom I have proposed the sending of some of their followers with Sirdar Jhundur Singh have readily acquiesced. Mohyooddeen Khan, Gund gurria has volunteered himself to accompany, and I have accepted the reluctant offer of Nuwah Khan of Tunnole to the same effect. The presence of these men may be useful to the Sirdar on emergency.

The uncle of Jehandad Khan the Bhalagra Chief, fled to me this day for refuge. He was preceded by a letter from Jehandad saying that his uncle was coming to attack him with all the levies of Tunnole and that report said the Sikh Troops in Pukli had joined them. He himself is to be here to-morrow. His confidant, Mir Zemaun Khan of Gundgurh, dictates to him the most cruel lawless and impolitic acts which have alienated all hearts from him. I long ago recommended him to discard this man but he makes himself too necessary to the Khan's pleasure.

There is a rumour to-day of some meditated commotion in the district but I cannot ascertain whence it arises or what is the nature of the apprehended movement. A man who seldom goes abroad left his house to give me the warning. Nuwab Khan of Tunnole complaining of the insufficiency of his jaghir of 1200 rupees, and volunteering to go with Sirdar Jhundur Singh, I accepted his offer to his great dismay. He

wards went to Sudai Chuttur Singh and without informing him ably) of what had passed got his sanction to remain here and send mother. I have insisted upon his holding by his first proposition, assured him it is his only hope of an increase of income

Captain Lumsden's note of the 5th instant came to hand to-day I answered it by this day's dak, 9th May 1848, daybreak.

J. ABBOTT, CAPTAIN,  
*Assistant Resident*

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17 — Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 9th May 1848.

9th May 1848—Huzarpur, Huzara — Received Captain Lumsden's note of the 6th instant. I had previously sent an express to Sudar Singh to inform him of Captain Edwards' critical position and him to hasten his march. I shall now let him know the altered state of affairs in that Doab, as it is highly desirable that his troops be in an effective condition. Whatever orders are necessary should be sent without delay to meet the Sudai at Pind Dadun Khan. If there be the slightest chance of defection it is far better they were recalled than already given the surmises of the people of this neighbourhood the feelings of the officers upon the subject, and these are not wanting. A single bad example is to be avoided. I have no late news from Peshawur though I write daily. Report says that Uisulla has fled thither for refuge from his son. Jehandad Khan, the Nagia Chief, has arrived in this neighbourhood. His uncle fled the day before yesterday. I should have preferred his remaining in his own country just now, but he professes to be alarmed and was urgent to come hither. Khan-i-Zeman Khan has not yet departed. Received a note from Sirdar Chuttur Singh, who is sending a confidential servant his son, Raja Shere Singh, endeavoured to settle some of the controversies amongst the Gundgurrias, and heard the case of alleged mutiny in January of the Golundauze of the Khowta guns. The Jemadar accuses me to be the culprit and the Golundauze seem wholly innocent. My judgment however pending the arrival of two witnesses called for

J. ABBOTT, CAPTAIN,  
*Assistant Resident*

No 18.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 10th May 1848

10th May 1848—*Hurrispoor, Huzara*—The post from Lahore has arrived this day without a letter for me. My letter has therefore been intercepted. I heard, however from Peshawur where all was right on the 8th. "Fertur sed mihi incredibile videtur exercitum Britannicum, dum ab humo implorat civium sanguis immerite perfusa dum ultimum gentes expectant frementes sese a hoste in Laborem firmare. Ita in Caburam fuit Ita hic si sit, Natio nos contemptu evnmeret. I spoke very seriously to Jehandad Khan upon the necessity of dismissing his evil genius Mir Zeman Khan Gundgurna assuring him that he had already through that man's counsels alienated the hearts of both subjects and neighbours, and that I should not interfere to prevent the consequences unless he were sent away. He is infatuated and will probably not listen to advice. It is highly necessary that any orders intended for Sirdar Jhundur Singh be sent him without delay to Pind Dadun Khan whether to halt, to advance, or to return. The risk is great of bringing troops into contact with treachery, the more especially if delay is meditated.

J ABBOTT CAPTAIN,

*Assistant Resident*

Closed at sunrise. Post not in. I have written daily (27th April) since the outbreak in Mooltan. I have receipts for only one or two covers.

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No 19.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 11th and 12th May 1848.

11th May 1848—*Hurrispoor, Huzara*—No letter to-day from Lahore. The chillaun also is blank so that if Captain Lumsden wrote his letter must have been intercepted at Lahore. The chillaun has, however, neither seal nor signature. Some receipts for my letters came by this post. But the signature is illegible so that I am quite ignorant whether my letters reach their destination or are intercepted. The Thannadar at Dunna writes that the detachment of 10 Zumbooras at that fort have deserted their post to join the rest of their troop marching with Sirdar Jhundur Singh. They had the strictest orders to stand fast.

It is much to be doubted whether Sirdar Jhundur Singh's Brigade should be allowed to advance further than Pind Dadun Khan. I have written several times to beg that further orders may be sent the Sirdar to that place. I still indulge the hope that vigorous measures will be taken to put down this revolt and that the Resident will not wait until the meshes of treachery are inextricably woven around us.

I have written urgently this day upon the subject to the Resident. The 27th April is the only day since the outbreak on which I have not written

*12th May 1848—Hurrpooi, Huzara.*—The post has brought me a note from Captain Lumsden after two blank posts. It is unfortunately not dated. It mentions the capture of General Kaun Singh for conspiracy. Yesterday, the Dunna Thannadar informed me of the first symptoms of disaffection in those mountains. The Kurrals had sent to the Dhoonds, telling them not to pay their rents as the Sikh Empire was over in Mooltan. The country is very strong and the weakened field force of Huzara could not spare a column sufficient for its subjection. A letter from Major Lawrence of the 9th gives favourable news to that date. He has enclosed me a copy of his note to the Resident which I have sent on under cover, lest it be lost. His arguments are of great weight, and I most earnestly hope the Resident will attend to them. I cannot believe that any two men acquainted with military matters and beyond suspicion as fearless and conscientious public servants could be found to advocate delay at this crisis.

News from Moozuffurabad states that Maharaja Goolab Singh is gradually strengthening that post (since the outbreak). The force amounts at present to 3,000 men. Rumour says he has thoughts of visiting the spot. He has always kept up a regular correspondence with the Barukzye chiefs at Cabul. Aid from him is confidently relied upon by the disaffected. But his operations are secret and I have no proof of machinations on his part in the present conspiracy. Three heavy guns which I ordered in from Karoo Khowta arrived yesterday, and fired a salute according to custom. The officers have not waited upon me, the first instance of neglect which I have experienced. I have sent for them therefore

Closed daybreak, 13th May

J ABBOTT, CAPTAIN,  
*Assistant Resident*



No 20 —Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 18th May 1848.

13th May 1848—Hurripoor, Huzara —No news by the Lahore dak to-day although Captain Lumsden gave me to suppose he would write daily I have also no certain information of the letters I write; a few receipts are returned with illegible cyphers, others never reappear My letters from Lahore rarely acknowledge receipt of any cover and often the seals appear to have been opened all this causes needless anxiety, and it is impossible to take fresh precautions unless I know how far the past have failed I have written daily (27th April excepted) since the outbreak at Mooltan and since Captain Lumsden opened his correspondence I have daily sent two covers, one of them to blm I hope it will be found possible to let me have a single line, if but of ten words, daily as then the failure of a dak will be manifest I have had three blank daks since Captain Lumsden's correspondence commenced. News from Peshawur up to the 11th favorable We live in the hope that the only measure which can avert the threatening evil has even though late been adopted, and that the British Army has advanced upon Mooltan. Had this measure been taken at once the Sikh Army had been paralyzed and had awaited to see the first results. The Chiefs of Huzara have made up their several parties, as usual when changes are expected All the Intelligence I can collect from the Sikh Army tends to the same impression at which I have often hinted and which Major Lawrence has plainly stated. The poor of this country look to me for protection and so long as we maintain our ancient reputation the Chiefs also will look to me for further advancement and for protection against their Government My great object is to prevent any excitement in the minds of the most excitable people in the world At present the country is still enjoying a measure of peace, prosperity and protection, unknown for forty years But any outbreak of the Huzara Field Force would arouse the discontented throughout the land. In spite of reports and impressions I indulge the hope that the Peshawur and Huzara Brigades would stand fast, not from disinclination to join, but from consideration of the hazard of deserting those important posts The I urral Chief, accused of having melted the Dhoonds to stop payment, has come in upon my summons I have no reason, however, to discredit the report, but at present my evidence is not sufficient for his convic

tion. He is the most treacherous and cowardly of all the chiefs of Huzara

J. ABBOTT, CAPTAIN,  
*Assistant Resident*

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**No 21.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 14th May 1848**

*14th May 1848—Hurripoor, Huzara.*—Having to-day taken the precaution to open the dak bag myself, I drew out the Resident's official letter of 8th and Captain Lumsden's notes of 10th and 11th instant. There cannot be a doubt from the bearing and evasive attempts of the Moonshee that this establishment is in the interest of the conspirators.

A report was yesterday brought, requiring confirmation, that Captain Edwardes had fallen upon and defeated with slaughter a large army of Mulkees upon the borders of Bukkur, another report, elicited from a boasting Sikh soldier, stated that the 15th *Jayt* (25th May) is the day appointed for the reunion of the whole Khalsa Army. Two Sapper Sergeants and 12 Pioneers arrived to-day to relieve the 12 on duty with the survey. I have detained the new arrivals pending reference, as their presence may be of the utmost value in case of commotions. They enable me and Lieutenant Robinson to sleep under a British sentry. The wisdom of Lord Hardinge provided me with an escort of British sipahis. The jealousy of the Military authorities deprived me of it. But the late officiating Resident and General Commanding the Division allowed me to retain 30 men of the company. These by some measure were reduced to 12, a number insufficient for the current duties. It seems to have been accepted as a matter of course that no tumults were to arise in the Sikh Army, whilst our justice had disgusted every predatory official in the Punjaub.

I have ever calculated upon commotions and have only wondered they were so long deferred. I arrived this evening at a musjid of the city just in time to prevent collision between the Moosulmans and Hindoos.

The musjid and temple are in the same neighbourhood and the *Asan* and *Sunh* are sounded together. This is most provoking to the Moosulmans as no human beings can vie with a conch in discord. I had previously endeavoured to arrange that the sounds should be differently timed. An uproar of this nature might be attended with consequences fatal to the peace of Huzara as the Sikhs of the army side with the Hindoos.

J ABBOTT CAPTAIN,  
*Assistant Resident*

Closed at daybreak 15th

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No 22.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, without date, received on the 11th May 1848

This day's post has brought no letter from Lahore. But the news from Peshawur up to 13th was favorable, all here continues quiet. I have let the Kurral Chief know that I shall visit upon him any demur of the Dhoonds to pay their rents. I have had many hearty assurances of devotion from the Chiefs of Huzara, and with timely intelligence should not fear being able to annihilate the Field Force here in the event of treachery; my great anxiety is to prevent excitation of the minds of the people. The condition of the country at present is so happy and smiling that it would wring my heart to see it disturbed. I have made this reply to all who have pressed their services upon me assuring them of my confidence and that if I need their aid I shall gladly summon them. Reports are less rife the last few days. General Sooltan Maimood sent an offering of quail and came over to wait upon me. This man has of late utterly neglected the etiquette prescribed by military discipline which I have not noticed because I have had occasion to report him unfavorably. The present symptom is indicative either of news unfavorable to the discontented or of a desire to lull suspicion. He is in correspondence with Mooltan. I took occasion to sound Colonel Richpal Singh as to the temper of his corps almost wholly composed of Sikhs. He assures me that he believes their fidelity unshaken. I told him that if the Sikh Army played any tricks we must destroy it to a man that we had apared it because the

sovereign was a minor, but that rebellion would oblige us to annihilate it ; that the regiments, however, who continued faithful would be cherished and honored The corps has been much on service under my own eye and is I think kindly inclined towards me. When I was about to run up to Uggrore I ordered the company of my escort to be relieved. But the whole of the men begged permission to remain saying that they had enjoyed the plains with me and would now take the toil of the mountains with pleasure.

J ABBOTT, CAPTAIN,  
*Assistant Resident.*

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**No. 23.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 16th May 1848.**

*16th May 1848—Hurriipoor, Huzara* —To-day's post has brought no letter from Lahore, nor any acknowledgment of my daily double cover. News from Peshawur of the 14th is favorable. Rumour is again busy and it is confidently believed by the troops here that the whole of the Sikh Force sent against Moolraj are engaged to desert to his standard. It is very certain that the Cavalry do not fight, and I never could comprehend the object of their mission. I was beginning to entertain some hope of the staunchness of the Huzara Field Force, but this evening I learn from Peshawur that Pertaub Singh, Commandant of a Missal of Sikh Horse of Sirdar Goordutt Singh's Gola, has deserted its post at Pukli, in spite of the repeated orders of Colonel Bhoop Singh, Commanding, and is in full march to join the Sirdar at his bidding I have written a strong remonstrance but without much hope of success, and the example is likely to produce the worst consequences. I have written so much and so strongly in my journals, notes and public despatches upon the absolute necessity of an instant advance of the British Army, that were I assured all my letters had reached their destination, I should not repeat advice in which I am so warmly backed by every person acquainted with the Punjaub and the Sikh Army Delay, when a fearful and instant retribution is everywhere expected, will be attributed to timidity We hold our position in the Punjaub wholly by the force of opinion, by the general belief in our superior courage and resources. Our

Empire in India has the same foundation and one or both may pass away if we evince any symptoms of hesitation. By delay, every traitor from the snowy mountains to the Sutlej will have time to complete his web. The army already faltering will it is to be feared succumb. Scinde may probably join in the rebellion, and the large British Force at this moment available may be necessary to preserve tranquillity in our own dominions. As to the danger from sun and flood it is a mere shadow compared with the peril of quiescence. We have every boat of the five rivers at command. Report says that the Jumboo Ruler is increasing his army quietly. It has been strengthened at Moozuffurabad, but this is nowise extraordinary, as the mountaineers there have received much wrong at his hands. We have no news from Edwardes or Taylor. Report again speaks of an engagement in that quarter, but the former report of Edwardes' victory over the Mooltanies is unconfirmed.

J ABBOTT, CAPTAIN,  
*Assistant Resident*

**No 24.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 17th May 1848.**

*17th May 1848*—After three barren posts from Lahore Captain Lumsden's notes of 13th and 14th instant have this day arrived together. From them I find that on the 14th fourteen of my letters *viz.* seven to the Resident and seven to Captain Lumsden had been intercepted. The Dak Moonshee produced chillauns signed by the Lahore Moonshee acknowledging the receipt of all. He has from the first been so disconcerted when asked about missing letters that strong suspicion has been inevitable. The whole post is manifestly engaged in a conspiracy, which is far wider spread than seems to be believed at Lahore. The prevailing report of the day is the participation of Maharaja Goolab Singh. He is said to have summoned many of the mountain chiefs of Huzara and to be in close correspondence with members of the army here. From Captain Lumsden's notes I gather that about 11 or more of his letters to me have been intercepted. This is a matter of the first importance and deserving vigorous measures of correction. The chillauns accompanying the Lahore post do not exhibit any notice of

the letters so that they are probably stopped at Lahore, though certainly not without knowledge of the Moonshee here. The soldiery still speak with confidence of the purpose of Sirdar Jhundui Singh's and Raja Sher Singh's Brigades to go over to the enemy. News from Peshawur up to 15th favorable. They have the same report there which prevails here, *viz*, that a day of this month is fixt for the general assembly of the Sikh Army. Their report, however, makes it 13th *Jayt*, ours the 15th. Sirdar Chuttur Singh paid me a visit this evening.

J ABBOTT, CAPTAIN,  
Assistant Resident.

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**No 25 — Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 18th May 1848.**

18th May 1848—*Hunipoon, Huzara* — This day's post brought me the Resident's letter No 192 of 15th instant and Mr Cock's note of same date, together with receipts for my letters of — This is some satisfaction, but it is not the less manifest that the Post Office establishment is devoted to the conspirators. I am somewhat comforted to learn that a powerful army is being assembled. But speed is of extreme importance, every hour of delay increasing the difficulty. From the consternation of the Jumboo Prince's people I gather that the reports of his participation are not unfounded. Colonel Canara called upon me to-day and informed me that an Adjutant named Urbail Singh had been sent to join his battery, who is noted as the most mutinous officer in the Sikh Army and as the principal instrument of Colonel Foulke's murder. I beg that a purwana may be sent recalling this man without delay, he has probably been sent here as a firebrand. A man who has returned from Sirdar Jhundui Singh's Brigade declares that the soldiers speak openly of their intention to side with the rebels, at Peshawur all was *in statu quo* on 16th. The Missal of Sirdar Goordut Singh Burhama's Gola of Horse, which deserted its post at Pukh, arrived here to-day in spite of my purwana to them to return. They have, however, promised to go back to their post to-morrow. A serious complaint of the grossest abuse is preferred against General Sooltan Maimood by the Native Officers and Golundauze of Colonel Canara's Battery. I long ago begged that this man might be removed from Huzara, where he had created one mutiny in the Artillery, but my

request was not complied with This battery is now so disgusted with his conduct that there is reason to apprehend desertion I have taken the evidence of the plaintiffs and will do my best to make some settlement, but it is a perplexing case

J ABBOTT, CAPTAIN,  
*Assistant Resident*

Closed at daybreak, 19th May

No 28.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 19th May 1848.

19th May 1848—Hurripoor, Husara—This day's post has brought me the Resident's letter of the 16th instant informing me of the deportation of the Queen-Dowager of Lahore and Mr Cocks note of the same date Yesterday I received the Resident's letter and Mr Cocks note of the 15th Intelligence from Peshawur of the 17th reports matters *in statu quo* I write daily two letters to Lahore The chulauns returned from thence acknowledge the receipt at Lahore of all the letters sent, yet they seem not to come to hand I have no authentic intelligence from Jumboo. Here all is still quiet Adjutant Urbail Singh has arrived. I have elsewhere in yesterday's note mentioned him It is highly advisable that he remain not here, as there are elements of strife in the Artillery and Infantry here stationed, which may turn into something worse. I have mentioned one of these, General Sooltan Maimood, whom I could wish removed to some honorable office elsewhere. Here he has almost created a second outbreak I think it would tend to soothe the irritation of the Sikh officers were they assured that in the corps which prove loyal the officers shall be reinstated in the rank of which they were deprived after the occupation of Lahore. I do not think they will ever heartily serve the Government whilst this is withheld I have no news of Sirdar Jhundur Singh of late date. The chief officers of his force are, I think, loyally inclined, but some of the privates speak openly of an intention to desert. The Cavalry Regiment is perhaps the best inclined. Had Colonel Umeer Singh retained his old company and battery it might have been depended upon But he has no knowledge of his present company, and they are probably disgusted at his reluctance to join them All the chiefs here are warm in their professions of loyalty and several

have begged permission to plant their sentries and sleep themselves around the tower which I occupy. But I have steadily declined any exhibition of diffidence toward my Sikh guards, who still furnish my sentinels. I am beside, most anxious not to unsettle people's minds by the prospect of change. The country at present is enjoying rare felicity and it must not be disturbed without the most urgent need. They assure me that in the course of a night from five to ten thousand armed men would gather under my banner were there any alarm of treachery. Reports have become less frequent of late. The last is that Raja Sher Singh had been defeated. There appears, however, no foundation for the rumours. I am truly happy to hear that a large British Force is assembling for Mooltan, and I trust that no more overtures will hinder its advance as it is a great object of the insurgents to gain time. I am obliged to make many repetitions because my letters seem to be intercepted.

J. ABBOTT, CAPTAIN,  
*Assistant Resident*

Closed at daybreak, 20th May.

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**No. 27.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 20th May 1848.**

*20th May 1848—Hurrimpoor, Huzara*—This day's post brought me the Resident's letter and Messrs Cocks' and Hodson's notes of the 17th. Reports have been less frequent for several days past. The army await with anxiety the result of Raja Sher Singh's advance and the conduct of his troops on the occasion. Colonel Canara's Golundauze Company here is almost disorganized by the insulting demeanour of General Sooltan Maimood, and in Richpal Singh's corps the most serious discontent has been evinced at past exactions of that officer. I am endeavouring to heal the wounds with the least possible agitation. Sirdar Goordut Singh's Missal of Horse returned to-day towards its post at Pukh. I had arranged with the Nazim to seize the principal officers should they persist in their mutiny. They plead the order of their Sirdar and their want of funds. I have ordered an advance to be made them on their return. From Peshawur the news continued favorable to the 8th. Major Lawrence is most anxious that the pay of the troops at Peshawur



and Huzara should not be entrusted to Sirdar Mehtab Singh's or Sirdar Goordut Singh's Horse. The latter has just arrived at Hussun Ubdal. It is certainly a matter of the first moment, and it seems advisable that drafts upon the neighbouring treasuries should furnish the needful funds instead of the cash being sent from a distance just now.

I write and send daily a diary and a note.

J ABBOTT, CAPTAIN,  
*Assistant Resident*

News from Pukh states that Moolraj has applied to Cabul for aid to be sent him by the lower route.

No 28.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 21st May 1848.

21st May 1848—Hurripoor, Huzara.—This day's post has brought me a duplicate of the Resident's letter No 197 of 16th May, the particulars of which I have explained and published. The army and garrisons here continue in the hush of expectation waiting to shape their conduct with the tide of coming events. The merchants and shopkeepers have taken alarm and dare not purchase the grain of the cultivators, the tide of travelling merchants has ceased to flow into Hurripoor confidence is at an end and can be restored only by a general clearing up of the political horizon. I dare not mention the remote time to which our forward movement is deferred. Unfortunately the public prints make no secret of it. In the present state of affairs in Mooltan the advance of our army would dissolve the conspiracy. The settlement of the case by quiet measures appears to me far from desirable. A terrible example is required and nothing less will restore our reputation to the brilliance it had acquired after the battle of Subraon. The punishment of two or three miserable instruments will not be accepted by the natives as the retribution due for the butchery of our Political Agents by such unparalleled treachery, and the peaceful surrender of Mooltan will leave our position in the Punjab weaker than ever. News of the 19th from Peshawur, all still quiet.

I believe Maharaja Goolab Singh is still in Cashmere and that the reports of his military movements have been distorted

He is not likely to take any overt part in a rebellion so little ripened.

J ABBOTT, CAPTAIN,  
*Assistant Resident.*

Should any Vuqueel from Moolraj come to Lahore, he will be entrusted with the task of seducing the army

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**No 29.—**Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 22nd May 1848.

22nd May 1848—*Hurripoor, Huzara*—Yesterday's post brought me Captain Lumsden's note of the 19th and a letter from Peshawur of the 20th From the latter place there is no news I have written daily to Lahore my diary and a note to one of the Assistants; the latter is sent through Dewan Adjoodhia Pershaud My letters have been pretty regular of late, but the irregularity will recommence whenever it is of importance to the conspirators to cut off our intelligence, as no one seems to have been punished for the former loss or detention of letters, of which Captain Lumsden once reported 12 to be due, which had not then arrived There are many reports in circulation; that of greatest importance is the intense interest with which the whole army and the Sikh population still look for the 15th of *Jayt* as the day for the appearing of their new Gooroo at Lahore

I purpose moving out for a few days into a cooler and healthier spot, about 14 miles north of Hurripoor All my people are getting ill here owing to the impurity of the water

I have ordered Adjutant Urbail Singh back to Lahore He has been sent here for mischief The accusations against Colonel Richpal Singh have been investigated and I hope to settle the matter quietly Those against General Sooltan Maimood are under investigation It were far better that he were removed At Jelum, Rohtas, Rawul Pindi and Ghaybi it is said (I know not by what authority) that Moolraj has agents enlisting soldiers, and that the Kardars wink at their proceedings

The absence of Captain Nicholson is much to be lamented.

It is also rumoured that the Ghaybi people have invited Moolraj to take possession.

J ABBOTT CAPTAIN,  
Assistant Resident

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No 30 —Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 23rd and 24th May 1848.

23rd May 1848—Hurripoor, Huzara —This morning I received Captain Lumsden's note of the 20th and news from Peshawur of the 21st, when all was *in statu quo* I have sent out my tent to a valley north of Hurripoor which is cool and shady I myself and all the establishment are getting ill and require change The water here is extremely unwholesome coming from the flooded fields and the heat is very great. A letter for Captain Edwardes from the Resident has been sent me by to-day's dak, evidently on purpose that it may not reach Captain Edwardes to whom it is distinctly addressed In the chilaun they have had the precaution to note "a letter for Captain Abbott," according to the testimony of the chuprassie Such shallow artifices cannot avail and I trust one or two of the establishment will be hanged or sent beyond seas, or there is no hope of any important letters arriving safely The whole establishment is in the pay of Moolraj or rather of Moolraj's employers I have no news from Bunnoo I sent my journal and note of yesterday by this morning's post as usual

24th May—Camp near Hurripoor —I left Hurripoor last night and am encamped in a shady cool spot in the neighbourhood The whole dak of to-day has been intercepted. I wrote last night a few lines in pencil to Captain Lumsden that he might not receive a blank dak but I sent no journal I write also daily to Peshawur from whence I heard to-day (date 22nd) all as before. This country remains quiet. But the army and the Sikh sect are all in anxiety to know whether Raja Sher Singh and Sirdar Jhundur Singh's Forces will desert to the enemy or continue staunch. Lieutenant Robinson and Mr Ingram are here with me employed upon the map I have one Sikh company and

12 horsemen as an escort, and the chiefs are in attendance or represented by sons or brothers. We have also 24 sappers and two sapper sergeants.

J ABBOTT, CAPTAIN,  
*Assistant Resident*

**No. 31.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 25th May 1848.**

*25th May 1848—Camp near Hurripoor*—The post of to-day has brought me the Resident's letter No 214 of 22nd May (to which I will reply at length) and Captain Lumsden's note of same date; all continues here as before. The letter bag due yesterday arrived when all hope of it was past, not, however, until I had ordered the dak Moonshee at Hurripoor to join my camp. It brought me Captain Lumsden's note of the 21st. As the insertion of prevalent reports has been blamed by the Resident, I shall insert no more without specific orders. I had supposed that such would be of the utmost value at the Residency, where all rumours from all quarters of the Punjaub can be compared together with a view to ascertain their probability. As a straw shows the action of an otherwise imperceptible current, so do these reports when compared together show the current of public feeling and very often are the only indications of deeply laid conspiracies. I regret to find that they are not only deemed unimportant, but that blame is attached to their simple insertion in a diary, which, if it be of any use whatever, is to convey a picture of passing impressions which time does not allow us to investigate or confirm. All continues in Huzara as before. The return of the Missal, which left its post in spite of repeated orders to stand fast, will I trust have a good effect. It could not be removed from Pukli without risk both of dispiriting the weakened brigade there and of encouraging the armed population to refuse payment of their rents. The position of the troops in Huzara is a great check upon their defection. The weakening of the Huzara Field Force by rendering their present position perilous would strengthen any disposition to desert it.

J ABBOTT, CAPTAIN,  
*Assistant Resident*

I wrote and sent yesterday my diary and a note to Captain Lumsden.

No 32.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara from the 26th to the 28th May 1848.

26th May 1848—*Camp near Hurripoor, Huzara.*—Employed the whole day in Kucherry reading urzees and settling disputes until sunset. News from Peshawur of the 24th favorable. The post came in late bringing Captain Lumsden's letter of the 23rd.

28th May—*Camp as above*—Employed as yesterday. The disputes concerning landed property in Dumtour are so virulent that I am obliged to send an especial Commisalonar to settle them. I would adjourn thither myself but for its distance from the dak line, a matter just now of some consequence.

The dak is in to-day in good time and brings me Captain Lumsden's note of 24th and a note from Captain Nicholson, Peshawur. Also a note from Captain Taylor Bunnoo without date giving a good account of the army and people up to the hour of writing. Captain Edwardes was on the right bank of the Indus opposite Lelah and General Cortlandt had gone to take possession of the Ghazee Khan Haquah.

J ABBOTT, CAPTAIN,  
*Assistant Resident*

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No 33.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 28th and 29th May 1848.

28th May—*Camp near Hurripoor*—After divine service I held Kucherry until sunset. Instead of forwarding my diary of to-day I have addressed an official letter to the Resident upon the subject of intelligence received from Cashmere that a Jumboo Force of 4,000 men is about to march to Moorzuffurabad, where there are already 3,000. This report may be a feint of the Maharaja to overcome the hill tribes, who though quite peaceful at present, have been much oppressed and are ready enough to rise when opportunity offers. It is however, quite needless for I have with me the son of Sooltan Hoosayne Khan, and our influence has previously been quite sufficient to keep them in

order It is highly desirable therefore that this report, which has greatly alarmed them and may drive them to desperation, be contradicted, and I have accordingly address the Maharaja disclaiming belief in such a rumour, and assuring him that any movement of troops in this direction at this moment will not have a friendly aspect The assembly of any force upon the frontier were an encouragement to the insurgents in Mooltan and to others who are disposed to join them.

*29th May 1848—Camp as above.*—Address another official letter to the Resident upon the subject above noted I had not understood yesterday that another Jumboo force was said to be about to march from Cashmere upon Kurnao, a district between the Cashmere river and the Kishengunga This Force is rated at 6,000 The mountaineers anxiously enquire of me whether they may not defend themselves from this invasion. I have declined putting any restraint upon their measures of self defence, assuring them, however, that any rising, excepting to resist invasion, would subject them to the displeasure of the British Government If they can act in concert, they ought to be able to destroy this force, large as it is, their country being strong and the whole population bearing arms

If these military movements are really contemplated, they are highly objectionable at this season, and of a most suspicious character The information is the best I can command, and agrees perfectly with the manifest apprehension of the Jumboo Moonshee in my camp

The Maharaja would plead his right to move his troops where-soever he pleases within his own kingdom, but he is perfectly well aware of the sensation they will create in the Punjaub

This is one of the many dangers to be apprehended from delay in avenging the innocent blood in Mooltan I have written so often and so strongly and so vainly upon the subject, backed by the authority of every officer in the Punjaub acquainted with the people and army, that I can scarcely hope my voice will avail at the eleventh hour But there shall at least be an official record that I have fearlessly recommended such a policy as would save the British name from degrading imputations, abate the courage of our enemies, and restore the confidence of our well-wishers

The people of the Punjaub honor and love us But every Kardar, every Moonshee, every Thannadar in short every creature that can write or cast accounts is our bitter enemy, and as all business must be transacted through them, their power is very considerable

J ABBOTT, CAPTAIN  
*Assistant Resident.*

I have written Captain Lumsden by this day's post through Dewan Adjoodhia Pershaud My official letter No 5 accompanies this.

No 34.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 30th May 1848.

30th May 1848—Camp near Hurrpooor Huzara—News from Mooruffurabad strengthens the information received from Cashmere. The Maharaja Goolab Singh is either marching a considerable force toward this frontier or he has contrived that such should be generally believed The whole valley of Pukli is in expectation and dread of a tyrant so abhorred by them It is well known that a close intimacy subsists between this Prince and Sirdar Chuttur Singh Nazim of Huzara, and it is generally believed that the intercourse by letter is frequent, yet I can get no intelligence of the state of affairs in Cashmere from this quarter Yesterday I sent to Lahore an official letter and my diary addressed to the Resident and a note to Captain Lumsden, the latter through the Dewan Adjoodhia Pershaud I received by the post of this day Captain Lumsden's notes of 26th and 27th the former was inserted in the chilaun of the former day, but a private note from Umbala was afterwards substituted for it The fraud was detected by their incautiously leaving the memo 'Kar i-sirkar' uneffaced News from Peshawur of the 28th favorable A report from Candahar states that the brothers there are fighting and that the city is invested. Afghan news however is always to be distrusted I have news of Captain Taylor as late as the 23rd All was well The people still obedient through the admirable arrangements made there and the army quiet But one and the same impression pervades all classes and regions *viz.*, that the Sikh troops will not fight in this cause

The post is just in with the news of Captain Edwardes' victories at Dera Ghazee Khan I propose publishing the tidings and firing a salute of 21 guns, which I trust will be approved

J. ABBOTT, CAPTAIN,  
*Assistant Resident.*

I have written as usual to Captain Lumsden by this post

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**No 35.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, from the 1st to the 3rd June 1848.**

*1st June 1848—Sherwaun, Huzara*—Marched to Sherwaun, a table summit about 20 miles north of Huiripoor, there I have a small bungalow and purpose remaining until summoned in any other direction by the state of affairs. The spot is central and the climate more healthful than any other part of Huzara

Reports from Pukli state that much alarm is felt there at the supposed advance of a Jumboo Force Excepting, however, the intelligence received from Sooltan Hoosayne Khan, who has the best means of information, all the accounts are vague and at any other time would attract no attention. At the present moment even false reports cannot be neglected owing to the effect they are calculated to produce upon the minds of the people and of the army, who receive them greedily The dak came in in good time News to the 29th from Peshawur favorable

*2nd June—Sherwaun.*—Much of my time is unnecessarily spent in collecting intelligence, giving private audiences, preparing the daily bulletin for Lahore and Peshawur The rest of the day is consumed in reading urzees and giving orders upon them and in arranging petty appeals in Kucherry. My power in this country is nothing if estimated by the troops at my command, but in the assurance the people have that I am their friend it is very great; and were I to deny myself to their appeals it would speedily be impaired I have no authentic intelligence of consequence. Many reports are spread designedly to unsettle men's minds.

*3rd June—Sherwaun.*—To-day I have been assailed by a host of rumors which turn into thin air the instant their authority is questioned.



That they are believed by the people I perceive from their anxiety on my account, and the enquiries they daily make whether I am sure all is right at Lahore.

The reasons for proclaiming Meean Jowahir Singh Raja of Bhimbur not having been communicated to me I am unable to conjecture how that step may affect the loyalty of the Maharaja of Jumboo. The general impression here is that it must cause him and his eldest son alarm; and if so double vigilance is requisite upon all his movements. The disaffected look to him as their only hope. But I imagine that the Sirdars in general have had enough of him nor does it seem probable that he would under any circumstances save those of apprehension, yield more countenance to rebels than would suffice to entangle them in their own toils and lend additional lustre to his own fidelity. Although Sooltan Hoosayne Khan has command of the best intelligence of his movements which in fact is necessary in his own safety yet the reports which have reached me the last day or two dispose me to question the accuracy of his report. The alarm continues in Pukli and in Kurnao, but there is no consistency in the estimate of the numbers of the army and all this alarm might have place equally were the Maharaja to whisper the project of an invasion which he did not really contemplate.

J ABBOTT CAPTAIN

*Assistant Resident*

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No 36—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 4th June 1848.

4th June 1848—*Sheraun*—There is little variety in the reports of this day, which veer north-east, but are not traceable to any substantial basis. The Sooltan's people sent a messenger for fresh intelligence who has just returned, and insists upon the correctness of the first report, but adds that the two columns have not yet moved, and that the Moozuffurabad Column is called a mere relief a designation belied by the appointment to it of Dewan Kurram Chund who was long in Pukli and carried favor with Umeen Khan, the principal Chief there, by supporting him in all his feuds and oppression. He is a fit instrument of intrigue, and should he really take command at Moozuffurabad, it

will be far more than his apparent office would indicate. In spite, however, of his influence over the Chief aforesaid, the dread and detestation of his master is so great and universal that I doubt not to be able to nullify his projects should their existence be manifested.

The letter bag came to-day without seal and contained no letter for me. An English writer on Lieutenant Robinson's establishment, who had been absent for some weeks, returned yesterday. It remains to be seen whether Captain Lumsden wrote

News of the 2nd from Peshawur is favorable and that from Bunnoo of 28th equally so. Held Kucherry as usual

J ABBOTT, CAPTAIN,  
*Assistant Resident*

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No. 37.—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 5th June 1848.

5th June 1848—*Sherwain, Huzara.*—The post bag to-day arrived open at bottom, whether accidentally or by design I know not. The chilaun corresponded with the contents, but as the chilauns are never sealed it is easy to change them. I received the Resident's two letters of the 1st and 2nd and an envelope containing a receipt, but no letter from Captain Lumsden has arrived either yesterday or to-day. The news from Peshawur is of the 3rd and favorable. I have also news from Captain Taylor of the 28th, when all was tranquil in his neighbourhood, Captain Edwardes being on the 23rd about 30 miles north of Pind Ghazee Khan.

The Resident's letter of the 2nd instant rebukes me for the tone of my communications as deficient in respect. I trust there shall be no further cause of complaint upon this score. The haste in which my despatches are penned may occasionally have begotten carelessness in the wording and more than once, had time allowed, I should have altered sentences in letters for which the post was waiting. I am fully sensible of the necessity of decorum in official correspondence. But the subjects which have lately engaged attention have been of the most exciting character in which it is difficult to soften down expressions without awakening the force of argument,—at least I, who write always

in haste and have no means of making copies of my journals, have found it so, and have regretted it

J ABBOTT, CAPTAIN,  
*Assistant Resident.*

Since yesterday there is no authentic intelligence from Cashmere Reports have been industriously circulated in Huzara that British influence has but a month more to run But with a single exception, viz a boundary dispute they have produced as yet no injury to my influence

J ABBOTT

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No 38—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 6th June 1848.

6th June 1848—*Sherwahn Huzara*—The post of to-day brought me a cover from Mr Skinner Head Clerk of the Residency enclosing letters from the post, but no letter from Captain Lumsden I hear how ever that he has been absent from Lahore The news from Peshawur is of the 4th and favorable. From Cashmere I have no very recent authentic intelligence. I have reason, however to believe, upon comparison of the various reports that the Sooltan's first information is substantially correct excepting as to the numbers It is probable that the calculations are made according to custom by the number of corps reckoning each at the old strength of 1,000 men What the real strength may be it is impossible to conjecture On the peace establishment the Jumboo regiments do not average above 250 men per corps But they are filled up according to the nature of the emergency to 500 or 800 men, seldom I think to 1,000 These regiments with a few exceptions are almost undrilled Being miserably paid and wholly without motive to gallantry, they were on two occasions defeated by the armed peasantry of Huzara with great loss, and in one case under circumstances reflecting great discredit upon the troops Nothing but the presence and interference of British Officers prevented their annihilation They are of course in the plain vastly inferior to the Sikh troops But in mountain campaigns, where the paths admit of but one abreast and evolutions are out of the question, the disparity is not so manifest and

the material of many of the corps is excellent, *viz.*, Dogra and Chibb Rajpootras. On these occasions numbers generally prevail or the hill-men are wearied out by delay and return to sow or to reap their crops.

A Sikh Gooi-oo has arrived at Hurripoor and has been received by the Sirdar and troops with extraordinary honor. I have not yet learnt who he is, from whence come, or whither bound.

The reports hinted at in former diaries continue prevalent. I cannot, however, find any solid basis for them, nor comprehend what can be hoped by the Sirdars from intrigues with the Dogra

J ABBOTT, CAPTAIN,  
*Assistant Resident*

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No. 39—Diary of Captain James Abbott, Assistant Resident, on deputation to Huzara, for the 7th June 1848

7th June 1848—*Sherwaun, Huzara*—Umeen Khaun, Chief of Pukh, whom I had summoned to consult with me upon the state of the frontier, has just arrived and brought more authentic intelligence. He says that six regiments have certainly marched upon Kuinao, but that no force had advanced upon Moozuffurabad. The strength of the regiments is unknown. He agrees with me that on my invitation they would to a man desert their master owing to the ill-treatment they experience.

The four regiments which are said to be camped upon the Moozuffurabad road, have very possibly been so posted merely to overawe the Sooltan, and, if so, their advance will be prevented by the letters addressed to the Maharaja. The whole army is contemptible as a foe, but the moral effect of its location upon the frontier at this moment would be favorable to the insurgents in Mooltan, as the disaffected persist in hoping for aid from Jumboo, and the power of the Dogra is greatly overrated by them. I have refused the present of a horse tendered by Umeen Khan, but at his earnest entreaty have accepted a small mule and have sent him the price (Rs 60) from my own purse as a portion of his *seeafut*.

The post from Lahore has not brought me a line from that city. The Peshawur post, for the first time during several weeks, has brought

*A Wing walls, abutments, and two semi-arches*

|                                     | No. | L.                                         | B.                  | D.             | Total.             |
|-------------------------------------|-----|--------------------------------------------|---------------------|----------------|--------------------|
| <b>Masonry</b>                      |     |                                            |                     |                |                    |
| Wells under wing walls              | 18  | (8 <sup>1</sup> × 5 <sup>1</sup> )         | 0 <sup>7</sup> 85 1 | 9 5            | 5 <sup>0</sup> 7 6 |
| Foundation blocks                   | 2   | (7 × 4)                                    | (7 × 4)             | 9 5            | 1 <sup>0</sup> 7   |
| Ditto                               | 4   | (10 <sup>1</sup> × 7 - 7 <sup>1</sup> × 4) |                     | 9 5            | 1 <sup>0</sup> 7   |
| Flooring over blocks                | 18  | 8 <sup>1</sup>                             | 0 <sup>7</sup> 85 1 | 1 5            | 1,33 <sup>7</sup>  |
| Ditto ditto                         | 2   | 7                                          | 7                   | 1 5            | 11 <sup>7</sup>    |
| Ditto ditto                         | 4   | 10 5                                       | 7                   | 1 5            | 411                |
| Ditto interval between blocks       | 2   | 8                                          | 4                   | 1 5            | 0 <sup>7</sup>     |
| Wing walls front                    | 2   | 22 <sup>1</sup> × $\frac{31416}{2}$        | 8                   | 3              | 1,07 <sup>0</sup>  |
| Ditto rear                          | 2   | 15 × 31416                                 | 8                   | 3              | 2 <sup>0</sup> 7   |
| Steps at flanks of bridge           | 4   | 1                                          | 3                   | 3              | 10 <sup>7</sup>    |
| Abutments                           | 2   | 13                                         | 4                   | 6              | 91 <sup>0</sup>    |
| Back ng of arch                     | 2   | 19                                         | 18                  | 4              | 27 <sup>3</sup>    |
| Skewbacks                           | 2   | 19                                         | 12                  | 0 <sup>7</sup> | 1 <sup>0</sup>     |
| Arch ring                           | 1   | 11 5                                       | 19                  | 1 5            | 3 <sup>0</sup> 4   |
| Span brills, solid                  | 1   | (13 × 31 - 22 1)                           |                     | 19             | 31 <sup>7</sup>    |
| Parapet                             | 4   | 5                                          | 15                  | 3 5            | 10 <sup>0</sup>    |
| Terminal blocks of ditto            | 4   | 3                                          | 2                   | 3 5            | 61                 |
| <b>Total Masonry</b>                |     |                                            |                     |                | 5,62 <sup>4</sup>  |
| <b>Dry Stone work</b>               |     |                                            |                     |                |                    |
| Above Inlet                         | 22  | 10                                         | 11                  | 2              | 41 <sup>0</sup>    |
| Below ditto                         | 22  | 15                                         | 11                  | 2              | 61 <sup>0</sup>    |
| <b>Total</b>                        |     |                                            |                     |                | 1,22 <sup>0</sup>  |
| <b>Erection</b>                     |     |                                            |                     |                |                    |
| First                               | 100 | 22                                         | 11                  | 2              | 3,32 <sup>0</sup>  |
| Second                              | 100 | 20                                         | 8                   | 2              | 8,02 <sup>0</sup>  |
| <b>Total</b>                        |     |                                            |                     |                | 12,34 <sup>0</sup> |
| <b>Cut Stone-work</b>               |     |                                            |                     |                |                    |
| Coping of parapets                  | 100 | 15                                         | 20                  | 0 5            | 3 <sup>0</sup>     |
| String course below 1 <sup>st</sup> | 100 | 11 5                                       | 10                  | 0 5            | 1 <sup>0</sup>     |
| Ditto round a entrance              | 100 | 19                                         | 10                  | 0 5            | 1 <sup>0</sup>     |
| Ditto in front wing walls           | 100 | 4 <sup>0</sup>                             | 10                  | 0 5            | 4 <sup>0</sup>     |
| Ditto in rear ditto                 | 100 | 19                                         | 10                  | 0 5            | 1 <sup>0</sup>     |
| Face of arch                        | 100 | 1 <sup>0</sup>                             | 10                  | 1 5            | 2 <sup>0</sup>     |
| <b>Total</b>                        |     |                                            |                     |                | 10 <sup>0</sup>    |

ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED  
DATE 10/10/01 BY 60322 UCBAW

UNITED STATES DEPARTMENT OF THE ARMY  
HEADQUARTERS, ARMY

MEMORANDUM FOR THE RECORD

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## A. Fall of 60 feet water-way.

|                                                              | No. | L.                   | B.                  | D.      | Total  |
|--------------------------------------------------------------|-----|----------------------|---------------------|---------|--------|
| <i>Masonry.</i>                                              |     |                      |                     |         |        |
| Foundation blocks ... ..                                     | 8   | (14×7) - (11×4)      |                     | 11      | 4,752  |
| Ditto ... ..                                                 | 6   | (12.5×7) - (3.5×4)   |                     | 11      | 2,722  |
| Ditto wells ... ..                                           | 22  | (8+5)×(8-5) 0.7851   |                     | 11      | 7,113  |
| Upper wing walls ... ..                                      | 2   | 18.5×3 1116×3×0.5    |                     | 12      | 2,092  |
| Revetment under Fall ... ..                                  | 1   | 60                   | $\frac{4+7}{2}$     | 18      | 6,910  |
| Semi-circular side revetments .                              | 2   | 31.25×3 1116         | $\frac{3+6}{2}$     | 18      | 15,901 |
| Steps on both sides of Fall ..                               | 2   | 22                   | 3                   | 1+7×0.5 | 629    |
| Walls joining semi-circular sides to<br>bridge ... ..        | 2   | 0                    | $\frac{3+6+4+4}{4}$ | 18      | 6,508  |
| Steps over ditto ... ..                                      | 2   | 12                   | 3                   | 6×0.5   | 216    |
| Raised wall next bridge ... ..                               | 2   | 14                   | 3                   | 0       | 601    |
| " " " " " " " " " " " "                                      | 1   | 60                   | 51.60               | 2       | 6,559  |
| " " " " " " " " " " " "                                      | 1   | (27.33×2) 0.7851     |                     | 2       | 4,639  |
| " " " " " " " " " " " "                                      | 1   | 0.5(60+49)           | 11                  | 2       | 1,199  |
| Bridge ... ..                                                | 12  | 68                   | 7                   | 2       | 9,744  |
| Back wall supporting steps ...                               | 1   | 68                   | 6.5                 | 2       | 638    |
| Ditto ditto ... ..                                           | 1   | 68                   | 4.5                 | 0       | 1,666  |
| Steps and arch below, equal to rec-<br>tangular prism ... .. | 1   | 68                   | 7                   | 8       | 3,218  |
| Abutment walls up to level of top<br>of steps ... ..         | 2   | 14                   | 4                   | 7×0.5   | 392    |
| Piers ditto ... ..                                           | 3   | 14                   | 3                   | 7×0.5   | 411    |
| Abutments up to spring ... ..                                | 2   | 22                   | 4                   | 6.5     | 1,141  |
| Piers ditto ... ..                                           | 3   | 22                   | 3                   | 6.5     | 1,287  |
| Backing over abutments ... ..                                | 2   | 10                   | 2                   | 7       | 632    |
| Archings ... ..                                              | 4   | 5.75×3 1116          | 19                  | 15      | 1,959  |
| Spandrills ... ..                                            | 4   | (13×7-39.27)         |                     | 19      | 3,931  |
| Parapets, upper curves ... ..                                | 2   | 12                   | 15                  | 3       | 108    |
| Ditto over bridge ... ..                                     | 2   | 49                   | 15                  | 3       | 411    |
| Ditto lower curves ... ..                                    | 2   | 15.75×3 1116         | 15                  | 3       | 415    |
| Dwarf pillars ... ..                                         | 4   | 2                    | 2                   | 3       | 49     |
| Lower wing wall ... ..                                       | 2   | 16.25×3 1116 0.5×2.5 |                     | 16.5    | 810    |
| Ditto ... ..                                                 | 2   | 16×3 1116 0.5×2      |                     | 6.5     | 653    |
| Steps beyond bridge, foundation<br>equal to ... ..           | 2   | 29                   | 6.8                 | 8       | 2,461  |
| Ditto superstructure ditto ...                               | 2   | 29                   | $\frac{9.5+2}{2}$   | 7×0.5   | 1,127  |
| Total Masonry ... ..                                         | .   | .....                | .....               | .....   | 69,008 |
| <i>Cut Stone-work.</i>                                       |     |                      |                     |         |        |
| Cell of Fall ... ..                                          | 1   | 60                   | 3                   | 1       | 180    |
| Walls of ditto ... ..                                        | 2   | 3                    | 9.5                 | 4       | 56     |
| Coping of parapets ... ..                                    | .   | 180                  | 20                  | 0.5     | 180    |
| Carried over ... ..                                          | ... | ..                   | ...                 | ...     | 37     |

|                                  | No.    | B.                             | D.    | L.    | Total.   |
|----------------------------------|--------|--------------------------------|-------|-------|----------|
| Brought forward ...              | ...    | .....                          | ..... | ..... | 396      |
| String course below parapets ... | ...    | 180                            | 1.0   | 0.5   | 90       |
| Ditto round half piers ...       | 8      | 23                             | 1.0   | 0.5   | 92       |
| Faces of arches ...              | 8      | 18                             | 1.0   | 1.5   | 216      |
| Total cut stone-work ...         | ...    | ...                            | ...   | ...   | 791      |
| <i>Dry Stone-work.</i>           |        |                                |       |       |          |
| Above Fall... ..                 | 1      | 70                             | 15    | 2.5   | 2,625    |
| Below ditto ... ..               | 1      | 40                             | 28    | 2.8   | 2,800    |
| Sides below steps ... ..         | 2      | 20                             | 6     | 6     | 1,440    |
| Total dry stone-work ...         | ...    | ...                            | ...   | ...   | 6,865    |
| <i>Concrete.</i>                 |        |                                |       |       |          |
| See items of flooring 1 ... ..   | ...    | ...                            | ...   | ...   | 6,559    |
| 2 ... ..                         | ...    | ...                            | ...   | ...   | 4,693    |
| 3 ... ..                         | ...    | ...                            | ...   | ...   | 1,199    |
| Total Concrete ...               | ...    | ...                            | ...   | ...   | 12,451   |
| <i>Excavation.</i>               |        |                                |       |       |          |
| Over all omitting for channel    |        |                                |       |       |          |
| 50 feet ... ..                   | 1      | 111                            | 67    | 6     | 44,622   |
| Bason rectangle ... ..           | 1      | 67                             | 60    | 20    | 80,400   |
| Semicircles... ..                | 2      | 67 <sup>2</sup> × 0.7854 × 0.5 | 20    | 20    | 70,513   |
| Total excavation ...             | ...    | ...                            | ...   | ...   | 1,95,535 |
| Metalling (whole length of work) | 1      | 180                            | 16    | 0.5   | 1,440    |
| Planks for closing bridge... ..  | 20 × 4 | 16                             | 0.5   | 0.125 | 80       |

## ABSTRACT.

|                                                                      | Rs.        |
|----------------------------------------------------------------------|------------|
| 1,95,535 Cubic feet excavation, at Rs. 6 per 1000 cubic feet ...     | 1,173      |
| 89,008 Ditto masonry, at Rs. 15 per 100 cubic feet ...               | 13,351     |
| 1,959 Ditto arch, at Rs. 20 per 100 cubic feet ...                   | 392        |
| 12,451 Ditto concrete, at Rs. 12 per 100 cubic feet ...              | 1,494      |
| 35 Blocks and wells, sinking, at Rs. 40 each ...                     | 1,400      |
| 35 Ditto, curbs, at Rs. 20 each ...                                  | 700        |
| 881 Cubic feet of cut stone-work at Rs. 30 per 100 cubic feet ...    | 238        |
| 6,865 Cubic feet of dry stone-work with piling, at Rs. 8 per 100 ... | 549        |
| 80 Cubic feet planks, at Rs. 3 per foot ...                          | 240        |
| 1,440 Ditto metalling, at Rs. 6 per 100 cubic feet ...               | 87         |
| Unwatering ...                                                       | 2,000      |
| Contingencies at 5 per cent. ...                                     | 1,081      |
| Total per one Fall 60 feet water-way ...                             | Rs. 22,705 |



If the soil be found favourable and such as to enable us to dispense with block sinking, this cost might be reduced as follows —

|                                                                                   |     |     |    |    |    |           |
|-----------------------------------------------------------------------------------|-----|-----|----|----|----|-----------|
| Say half the masonry in blocks or 7,000 cubic feet at Rs. 15 per 100 cubic feet . | ..  | ..  | .. | .. | .  | Rs 1,050  |
| Curbs for blocks                                                                  | ... | ... |    | .. | .. | 700       |
| Sinking blocks                                                                    | ..  | ..  |    |    | .. | 1,400     |
| Unwatering                                                                        | ..  | ..  | .. | .. | .  | 2,000     |
| Contingencies at 5 per cent                                                       | ..  | ..  | .. |    |    | 257       |
| Total                                                                             |     |     |    |    |    | Rs 5,407  |
| Leaving the cost of the 60 feet Fall                                              |     |     |    |    |    | .. 17,208 |



APPENDIX B.—DETAILED ESTIMATES OF 1861.

No. 10, MASONRY FALLS.

B. Fall of 30 feet water-way.

|                                              | No.   | L.                              | B.            | D.          | Total. |
|----------------------------------------------|-------|---------------------------------|---------------|-------------|--------|
| <i>Masonry.</i>                              |       |                                 |               |             |        |
| Foundation blocks                            | 6     | (12×7) — (9×4)                  |               |             | 2,880  |
| Ditto                                        | 3     | (10·5×7) — (7·5×4)              |               | 10          | 1,305  |
| Ditto walls                                  | 16    | (8+5) × (8-5) 0·7854            |               | 10          | 4,901  |
| Upper wing walls...                          | 2     | 13·75 × 3·1416 × 2·5 × 0·5      | 2+5           | 8           | 863    |
| Revetment under Fall                         | 1     | 30                              | 2             | 13          | 1,365  |
| Ditto semi-circular at sides                 | 2     | 20·5 × 3·1416                   | 2+4           | 13          | 5,203  |
| Steps over ditto on both sides of Fall       | 2     | 9                               | 2 (1+4) × 0·5 |             | 90     |
| Raised wall next to bridge                   | 2     | 12                              | 2             | 4           | 192    |
| Flooring rectangle                           | 1     | 41                              | 30            | 2           | 2,460  |
| Ditto 2 semi-circle (or circle)              | 1     | 41 × 41                         | 0·7854        | 2           | 2,640  |
| Ditto 7 feet in front of bridge              | 1     | 32                              | 7             | 2           | 448    |
| Ditto over blocks of steps                   | 2     | 38                              | 7             | 2           | 1,064  |
| Back wall supporting steps                   | 1     | 38                              | 6             | 2           | 456    |
| Ditto                                        | 1     | 38                              | 4             | 3           | 452    |
| Steps and arches below, equal to             | 1     | 38                              | 3             | 3           | 344    |
| Abutment walls up to level of top step       | 2     | 14                              | 4             | 8           | 1,826  |
| Piers ditto                                  | 3     | 14                              | 2             | 7 × 0·5     | 392    |
| Abutment up to ditto                         | 2     | 21                              | 4             | 7 × 0·5     | 294    |
| Ditto to top                                 | 3     | 21                              | 4             | 4           | 672    |
| Piers up to top                              | 4     | 21                              | 2             | 3           | 504    |
| Arches taken solid from spring               | 2     | 19                              | 6             | 8           | 1,008  |
| Lower wing walls...                          | 2     | 11·75 × 3·14 × 0·5 × 2·5 × 12·5 |               | 3·5         | 1,596  |
| Ditto                                        | 2     | 11·50 × 3·14 × 0·5 × 2·0 × 4·5  |               | 4·5         | 922    |
| Parapets, upper curves                       | 2     | 8                               | 1·5           | 3           | 172    |
| “ over bridge                                | 2     | 34                              | 1·5           | 3           | 72     |
| “ lower curves                               | 2     | 10·5 × 3·1416                   | 1·5           | 3 × 0·5     | 306    |
| “ Dwarf pillars                              | 4     | 2                               | 2             | 3           | 148    |
| Steps below bridge, foundation, equal to ... | 2     | 18·5                            | 4             | 3·5         | 48     |
| Ditto superstructure                         | 2     | 18·5                            | 6             | (2+5) × 0·5 | 518    |
| Total Masonry                                | ...   | .....                           | .....         | .....       | 777    |
| <i>Cut Stone-work.</i>                       |       |                                 |               |             |        |
| of Fall...                                   | 1     | 30                              |               |             | 33,938 |
| ies of ditto                                 | 2     | 3                               | 2·5           | 1           | 75     |
| ing of parapets                              | ..... | 116                             | 1·5           | 3           | 27     |
| ng course below ditto                        | ..... | 116                             | 2·0           | 0·5         | 116    |
| o round piers                                | 8     | 22                              | 1·0           | 0·5         | 55     |
| s of arches                                  | 8     | 7                               | 1·0           | 0·5         | 88     |
| Total Cut-stone                              | ...   | .....                           | .....         | .....       | 84     |
|                                              |       |                                 |               |             | 448    |

|                                                                 | No. | L.                       | B.    | D.  | Total. |
|-----------------------------------------------------------------|-----|--------------------------|-------|-----|--------|
| <i>Dry Stone-work.</i>                                          |     |                          |       |     |        |
| Above Fall... ..                                                | 1   | 35                       | 10    | 2.5 | 875    |
| Below bridge ... ..                                             | 1   | 25                       | 18.5  | 2.5 | 1,156  |
| At sides below steps ... ..                                     | 2   | 15                       | 5     | 5   | 750    |
| Total Dry Stone-work ... ..                                     | ... | ...                      | ...   | ... | 2,781  |
| <i>Concrete.</i>                                                |     |                          |       |     |        |
| See items in flooring 1 ... ..                                  | ... | ...                      | ...   | ... | 2,400  |
| " " 2 ... ..                                                    | ... | ...                      | ...   | ... | 2,610  |
| " " 3 ... ..                                                    | ... | ...                      | ...   | ... | 418    |
| Total Concrete ... ..                                           | ... | ...                      | ...   | ... | 5,518  |
| <i>Excavation.</i>                                              |     |                          |       |     |        |
| Over all, including berm and omitting 30 feet of channel ... .. | 1   | 72                       | 50    | 4   | 11,100 |
| Mason rectangle ... ..                                          | 1   | 50                       | 30    | 17  | 25,500 |
| Semi-circular ... ..                                            | 2   | 50 <sup>2</sup> × 0.7854 | 0.5   | 17  | 33,379 |
| Total Excavation ... ..                                         | ... | ...                      | ...   | ... | 73,279 |
| <i>Metalling</i> (whole length of work) ... ..                  | 1   | 110                      | 15    | 0.5 | 840    |
| Planks for closing bridges ... 12 × 4                           | 12  | 0.5                      | 0.125 | 36  |        |

## ABSTRACT.

|                                                                    | Ra.   |
|--------------------------------------------------------------------|-------|
| 73,279 Cubic feet excavation, at Rs. 5 per 1,000 cubic feet ... .. | 410   |
| 33,779 Ditto Masonry, at Rs. 15 per 100 cubic feet ... ..          | 5,061 |
| 5,518 Ditto Concrete, at Rs. 12 per 100 cubic feet ... ..          | 666   |
| 25 Blocks, sinking, at Rs. 40 each ... ..                          | 1,000 |
| 25 Blocks, curbs, at Rs. 20 each ... ..                            | 500   |
| 418 Cubic feet cut stone-work, at Rs. 30 per 100 cubic feet ... .. | 131   |
| 2,781 Ditto dry stone-work with piling, at Rs. 8 per 100 ... ..    | 222   |
| 36 Ditto planks, at Rs. 3 per cubic foot ... ..                    | 108   |
| 880 Ditto metalling, at Rs. 6 per 100 cubic feet ... ..            | 53    |
| Unwatering ... ..                                                  | 300   |
| Contingencies at 5 per cent. ... ..                                | 456   |

Total for one Fall 30 feet water-way Ra. 9,570

If the soil should be found favourable, so that block-sinking and any charge for unwatering should prove unnecessary, the cost may be reduced by the following items:—

|                                                               | Ra.   |
|---------------------------------------------------------------|-------|
| Half of the masonry in blocks, or say 4,500 cubic feet ... .. | 675   |
| Curbs of blocks ... ..                                        | 500   |
| Sinking of blocks ... ..                                      | 1,000 |
| Unwatering ... ..                                             | 300   |
| Contingencies at 5 per cent. ... ..                           | 151   |

Total Ra. 3,226

Leaving the cost of the 30 feet Fall ... Ra. 6,344

## APPENDIX B:—DETAILED ESTIMATES OF 1861.

|                                                                | No. | L.          | B.       | D.      | Total    |
|----------------------------------------------------------------|-----|-------------|----------|---------|----------|
| Brought forward ...                                            | ... | .....       | .....    | .....   | 62,81    |
| Straight wing above lock gate right                            | 1   | 3           | 5        | 4       | 6        |
| across ditto ...                                               | 1   | 8           | 4        | 8       | 256      |
| Ditto ditto ...                                                | 1   | 12          | 4        | 8       | 384      |
| Curved wings,, (including semi-circle as 2)                    | 4   | 3'14 x 13'5 | 4        | 16      | 1,085    |
| Distributing channel head, curtain wall, upper                 | 1   | 12          | 2        | 8       | 192      |
| Ditto floor above bridge                                       | 1   | 8           | 10+6     | 1'5     | 96       |
| Ditto abutments of bridge                                      | 2   | 19          | 3        | 14      | 1,596    |
| Ditto tail curve                                               | 1   | 3'14 x 13'5 | 3        | 14      | 3,561    |
| Tail curtain wall                                              | 1   | 8           | 2        | 6       | 96       |
| Flooring                                                       | 1   | 4           | 7        | 1'5     | 42       |
| Centre flooring                                                | 1   | 19          | 6        | 1'5     | 171      |
| Bridge taken solid from spring                                 | 1   | 19          | 6        | 1'5     | 456      |
| Parapets                                                       | 2   | 12          | 1'5      | 3       | 108      |
| Centre wall of lock chamber from drop to recess for lower lock | 1   | 105         | 9        | 16      | 15,120   |
| Side ditto ditto ditto...                                      | 1   | 105         | 8        | 10      | 8,400    |
| Ditto ditto ditto...                                           | 1   | 105         | 5        | 6       | 3,150    |
| Buttresses                                                     | 9   | 4           | 1+2      | 4       | 216      |
| Side waste channel wall below Mills                            | 1   | 53          | 5        | 16      | 4,240    |
| Centre walls at recess of lock                                 | 1   | 12          | 8        | 16      | 1,536    |
| Ditto side wall of locks                                       | 1   | 12          | 8        | 16      | 1,536    |
| The same under bridge, 1st                                     | 1   | 19          | 9        | 21      | 3,591    |
| Ditto ditto 2nd                                                | 2   | 19          | 5        | 21      | 1,990    |
| Ditto ditto ditto                                              | 1   | 5           | 3        | 21      | 315      |
| Steps in front of bridge, total length                         | 1   | 15          | 10       | 5 x 0'5 | 375      |
| Parapets to ditto                                              | 2   | 10          | 1'5      | 3       | 90       |
| Bridges taken solid 2 feet above spring                        | 1   | 16+10       | 19       | 4       | 1,976    |
| Parapets                                                       | 2   | 38          | 1'5      | 3       | 342      |
| Tail steps                                                     | 1   | 26          | 9        | 3       | 2,925    |
| Parapets of ditto                                              | 2   | 25          | 1'5      | 3       | 225      |
| Tail wings (mean height)                                       | 2   | 3'14 x 0'5  | 27'5 x 5 | 23      | 9,930    |
| educt hollows under upper lock..                               | 1   | 16          | 3        | 4       | 1,26,873 |
| to in centre walls                                             | 7   | 10          | 3        | 5       | 192      |
| Ditto ditto                                                    | 7   | 10          | 2        | 3       | 1,050    |
|                                                                |     |             |          |         | 420      |
| Total cubic feet of Masonry ...                                | ... | .....       | .....    | .....   | 1,662    |
| Concrete.                                                      |     |             |          |         | 1,25,211 |
| chamber body                                                   | 1   | 97          | 16       | 2       | 3,101    |
| e channel                                                      | 1   | 56          | 9        | 2       | 1,008    |
| Carried over ...                                               | ... | .....       | .....    | .....   | 4,112    |

|                                                         | No  | L.    | B      | D    | Total     |
|---------------------------------------------------------|-----|-------|--------|------|-----------|
| Brought forward ...                                     | ... | ..... | .....  | ...  | 4,112     |
| Lock chamber under bridge ...                           | 1   | 19    | 15 5   | 2    | 559       |
| Ditto below tail flooring ..                            | 1   | 19    | 17     | 2    | 616       |
| Waste chamber ditto ..                                  | 1   | 19    | 11 5   | 2    | 437       |
| Sluice chamber ..                                       | 1   | 7     | 10     | 2    | 221       |
| Ditto in waste channel ..                               | 1   | 13    | 9      | 2    | 231       |
| Total Concrete ...                                      | ... | ..    | ... .. | ...  | 6,212     |
| <i>Dry Stone work</i>                                   |     |       |        |      |           |
| At head, say equal to ...                               | 1   | 120   | 10     | 3    | 3,600     |
| At Tail ..                                              | 1   | 100   | 10     | 3    | 3,000     |
| Total Dry Stone-work ...                                | ..  |       |        |      | 6,600     |
| <i>Wood work.</i>                                       |     |       |        |      |           |
| Lock gates, upper                                       | 4   | 11-33 | 0-66   | 8    | 239       |
| Ditto lower ..                                          | 4   | 11-33 | 0-66   | 16   | 478       |
| Screen beams                                            | 4   | 19    | 0-75   | 0-75 | 43        |
| Planks for stopping waste channel                       |     | 10-5  | 8      | 0-12 | 10        |
| Total Wood work ..                                      | ..  |       | ...    | .    | 770       |
| <i>Excavation.</i>                                      |     |       |        |      |           |
| Lock channel upper width = 15, + 1 5                    |     |       |        |      |           |
| depth ... ..                                            | 1   | 3,300 | 27     | 8    | 712,800   |
| Ditto lower ..                                          | 1   | 3,300 | 39     | 16   | 2,059,200 |
| This will cover the excavation<br>for the lock chamber. |     |       |        |      |           |
| Total Excavation ..                                     | ... | .     |        |      | 2,772,000 |
| <i>Cut Stone-work</i>                                   |     |       |        |      |           |
| Coping of parapets                                      |     | 150   | 2      | 0-5  | 150       |
| String courses to ditto ..                              | ..  | 100   | 1      | 0-5  | 20        |
| Faces of arches ...                                     |     | 20    | 15     | 15   | 45        |
| Seats for lock gate pivots upper                        | 2   | 8     | 2      | 15   | 30        |
| Ditto ditto lower                                       | 2   | 16    | 2      | 15   | 36        |
| Ditto for sills of both lock gates                      | 4   | 12    | 2      | 15   | 144       |
| Grooves in waste channel                                | 2   | 8     | 2      | 10   | 32        |
| Ditto for mill sluices ..                               | 12  | 8     | 1      | 0-5  | 48        |
| Total Cut-stone ..                                      | ... | ..    | ..     | .    | 601       |

### ABSTRACT.

|                                                                                      |                                                              |     |     |         |        |
|--------------------------------------------------------------------------------------|--------------------------------------------------------------|-----|-----|---------|--------|
| 2772,000                                                                             | Cubic feet excavation, at Rs. 2-8 per 1000 cubic feet        | ... | ... | Rs.     | 6,930  |
|                                                                                      | Contingencies, at 5 per cent.                                | ... | ... | ...     | 346    |
| Total Navigable Channel                                                              |                                                              |     |     | ...     | 7,276  |
| 1,25,211                                                                             | Cubic feet masonry, at Rs. 15 per 100 cubic feet             | ... | ... |         | 18,781 |
| 53                                                                                   | Curbs for blocks, at Rs. 25 each                             | ... | ... | ...     | 1,325  |
| 53                                                                                   | Sinking blocks, at Rs. 50 each                               | ... | ... | ...     | 2,650  |
| 6,242                                                                                | Cubic feet concrete, at Rs. 12 per 100 cubic feet            | ... | ... |         | 749    |
| 6,600                                                                                | Ditto dry stone-work with cribs and piles, at Rs. 10 per 100 | ... | ... |         | 660    |
| 770                                                                                  | Ditto wood-work, say at Rs. 5 per foot                       | ... | ... |         | 3,850  |
| 601                                                                                  | Ditto Cut stone-work, at Rs. 30 per 100 feet extra charge... | ... | ... |         | 181    |
| 5                                                                                    | Drum sluices, at Rs. 100 each                                | ... | ... | ...     | 500    |
|                                                                                      | Contingencies at 5 per cent.                                 | ... | ... | ...     | 1,435  |
| Total cost of lock                                                                   |                                                              |     |     | ... Rs. | 30,131 |
| Total lock and channel                                                               |                                                              |     |     | ...     | 37,407 |
| If the soil prove favourable the following reductions may be made:—                  |                                                              |     |     |         |        |
|                                                                                      |                                                              |     |     |         | Rs.    |
| Two-thirds of the masonry blocks, or say 20,000 cubic feet, at Rs. 15 per 100 feet   |                                                              |     |     |         | 3,000  |
| Curbs for blocks                                                                     |                                                              |     |     |         | 1,325  |
| Sinking blocks                                                                       |                                                              |     |     |         | 2,650  |
| Half the concrete, leaving the rest as equivalent to increased thickness of flooring |                                                              |     |     |         | 375    |
| Contingencies, at Rs. 5 per cent.                                                    |                                                              |     |     |         | 367    |
| Total reduction                                                                      |                                                              |     |     | ...     | 7,717  |
| Leaving the cost of the single lock                                                  |                                                              |     |     |         | 22,413 |
| Add channel as before                                                                |                                                              |     |     |         | 7,276  |
| Total for lock and channel                                                           |                                                              |     |     |         | 29,689 |

*B. Double Locks with double Waste Channels on Main Canal, 14 feet depth of water.*

|                                                                               | No. | L.                | B.   | D.  | Total.   |
|-------------------------------------------------------------------------------|-----|-------------------|------|-----|----------|
| <i>Masonry.</i>                                                               |     |                   |      |     |          |
| Foundation blocks ..                                                          | 6   | (9×6)–(6×3)       |      | 13  | 2,508    |
| Ditto ..                                                                      | 3   | (9×6.5)–(6×3.5)   |      | 13  | 1,462    |
| Ditto ..                                                                      | 45  | (9×7)–(6×4)       |      | 13  | 22,815   |
| Ditto ..                                                                      | 3   | (9.5×7)–(6.5×4)   |      | 13  | 1,579    |
| Ditto ..                                                                      | 7   | (10×7)–(7×4)      |      | 13  | 3,822    |
| Ditto ..                                                                      | 8   | (11×7)–(8×4)      |      | 13  | 4,620    |
| Ditto ..                                                                      | 2   | (12.5×7)–(9.5×4)  |      | 13  | 1,287    |
| Ditto ..                                                                      | 12  | (13×7)–(10×4)     |      | 13  | 7,956    |
| Ditto ..                                                                      | 9   | (13.5×7)–(10.5×4) |      | 13  | 6,112    |
| Flooring on lower level—                                                      |     |                   |      |     |          |
| 1st over all from front blocks of lock to middle of bridge, width 3×9+2×10... | 1   | 122               | 59   | 2   | 15,576   |
| 2nd ditto as far as rear of bridge                                            | 1   | 81                | 59   | 2   | 1,003    |
| 3rd lower portion of waste channels to rear of bridge                         | 1   | 50                | 30   | 2   | 3,000    |
| 4th across front blocks of tail                                               | 1   | 92                | 12.5 | 2   | 2,700    |
| " next 1 block of tail                                                        | 1   | 110               | 7.5  | 2   | 1,550    |
| " last line of blocks at tail...                                              | 1   | 130               | 7    | 2   | 1,820    |
| Steps for fall in waste channel                                               | 2   | 10                | 4    | 2   | 210      |
| Ditto ditto ditto                                                             | 2   | 10                | 4    | 0   | 480      |
| Ditto ditto ditto                                                             | 2   | 10                | 2    | 2   | 80       |
| Flooring of waste channel, upper level                                        |     |                   |      |     |          |
| Walls of recesses ..                                                          | 2   | 100               | 10   | 2   | 4,000    |
| Ditto ..                                                                      | 2   | 13                | 2    | 0   | 468      |
| Ditto ..                                                                      | 4   | 6                 | 3    | 0   | 432      |
| Front curtain wall of waste channel                                           |     |                   |      |     |          |
| Ditto ditto ditto                                                             | 12  | 13                | 5    | 2   | 260      |
| Ditto ditto ditto                                                             | 12  | 13                | 4    | 2   | 208      |
| Ditto ditto ditto                                                             | 12  | 13                | 3    | 2   | 156      |
| Side wall at Mills                                                            | 10  | 65                | 5    | 14  | 7,700    |
| Ditto to head of small bridges                                                | 10  | 31                | 4    | 14  | 3,472    |
| Small arches over channels                                                    | 20  | 10                | 6    | 4.5 | 510      |
| Foundation of centre walls, upper                                             | 3   | 20                | 0    | 2   | 1,060    |
| Ditto ditto ditto                                                             | 3   | 19.5              | 0    | 2   | 1,063    |
| Ditto ditto ditto                                                             | 3   | 19                | 0    | 4   | 2,052    |
| Centre wall upper end, superstructure                                         |     |                   |      |     |          |
| Ditto ditto ditto                                                             | 1   | 8                 | 8    | 6   | 768      |
| Ditto ditto ditto                                                             | 1   | 8                 | 7    | 6   | 336      |
| Ditto ditto ditto                                                             | 3   | 6.5               | 0    | 6   | 1,063    |
| Ditto ditto ditto                                                             | 3   | 9×9               | 0.75 | 6   | 1,157    |
| Curtain walls to 2 lock chambers                                              |     |                   |      |     |          |
| Ditto ditto ditto                                                             | 12  | 16                | 5    | 2   | 320      |
| Ditto ditto ditto                                                             | 12  | 16                | 4    | 2   | 256      |
| Ditto ditto ditto                                                             | 12  | 16                | 3    | 2   | 192      |
| Flooring above lock                                                           | 10  | 19                | 16.5 | 2   | 1,254    |
| Blocks under lock gates right across both locks and 3 walls                   | 2   | 23                | 7    | 8   | 608      |
| Carried over ..                                                               | ..  |                   |      |     | 1,12,012 |

|                                                                                  | No. | L.          | B.               | D.             | Total.   |
|----------------------------------------------------------------------------------|-----|-------------|------------------|----------------|----------|
| Brought forward ...                                                              | ... | .....       | .....            | ...            | 1,12,045 |
| Curved wings, including as two semi-circles of distribution channel heads ... .. | 6   | 3·14 × 13·8 | 2·5              | 12             | 7,630    |
| Distribution channel heads, centre walls upper ... ..                            | 2   | 12          | 2                | 8              | 384      |
| Ditto floor above bridge ... ..                                                  | 2   | 8           | $\frac{10+6}{2}$ | 1·5            | 192      |
| Ditto abutments of bridges ... ..                                                | 4   | 19          | 3                | 12             | 2,736    |
| Ditto tail curves ... ..                                                         | 4   | 3·14 × 13·5 | 2·5              | 12             | 5,087    |
| Ditto tail curtain walls ... ..                                                  | 2   | 8           | 2                | 6              | 192      |
| Ditto centre flooring ... ..                                                     | 2   | 19          | 6                | 4              | 912      |
| Ditto tail ditto ... ..                                                          | 2   | 4           | 7                | 1·5            | 84       |
| Ditto bridges taken solid from spring ... ..                                     | 2   | 19          | 6                | 4              | 912      |
| Ditto parapets ... ..                                                            | 4   | 12          | 1·5              | 3              | 216      |
| Centre walls of locks from drop to recess for tail locks ... ..                  | 3   | 105         | 9                | 14             | 39,690   |
| Wall of waste channel below mills                                                | 2   | 53          | 5                | 14             | 7,420    |
| Centre walls at recess of locks ...                                              | 2   | 12          | 8                | 14             | 2,688    |
| Ditto ditto ditto ... ..                                                         | 1   | 12          | 7                | 14             | 1,176    |
| Centre walls under bridge ... ..                                                 | 3   | 19          | 9                | 19             | 9,747    |
| Side ditto ... ..                                                                | 2   | 19          | 5                | 19             | 3,610    |
| Steps in front of bridges (total length) ... ..                                  | 1   | 33          | 10               | 5 × 0·5        | 825      |
| Parapets to ditto ... ..                                                         | 6   | 10          | 1·5              | 3              | 270      |
| Bridges taken solid 2 feet above spring of large arches ... ..                   | ... | 52          | 19               | 4              | 3,952    |
| Parapets ... ..                                                                  | 2   | 68          | 1·5              | 3              | 612      |
| Tail steps ... ..                                                                | 3   | 26          | 9                | $\frac{23}{2}$ | 8,073    |
| Parapets of ditto ... ..                                                         | 6   | 25          | 1·5              | 3              | 675      |
| Tail wings (mean height) ... ..                                                  | 2   | 3·14 × 0·5  | 27·5 × 5         | 21             | 9,067    |
|                                                                                  |     |             |                  |                | 2,18,195 |
| Deduct hollows under blocks ... ..                                               | 2   | 16          | 3                | 4              | 384      |
| Ditto in centre walls in two ... ..                                              | 14  | 10          | 3                | 5              | 2,100    |
| and ... ..                                                                       | 14  | 10          | 2                | 3              | 840      |
| Add in one ... ..                                                                | 10  | 10          | 3                | 5              | 1,500    |
| and ... ..                                                                       | 10  | 10          | 2                | 3              | 600      |
|                                                                                  |     |             |                  |                | 5,424    |
| Total Masonry ... ..                                                             | ... | .. ..       | .....            | .....          | 2,12,771 |
| <i>Concrete Work.</i>                                                            |     |             |                  |                |          |
| Lock chambers ... ..                                                             | 2   | 97          | 16               | 2              | 6,208    |
| Waste channel ... ..                                                             | 2   | 56          | 9                | 2              | 2,016    |
| Lock chamber under bridge ... ..                                                 | 2   | 19          | 15·5             | 2              | 1,178    |
| Ditto below tail flooring ... ..                                                 | 2   | 19          | 16               | 2              | 1,216    |
| Carried over ... ..                                                              | ... | .....       | .....            | .....          | 10,618   |



|                                  | No | I     | B    | D    | Total   |
|----------------------------------|----|-------|------|------|---------|
| Brought forward                  |    |       |      |      | 10 618  |
| Waste channel tails              | 2  | 19    | 11 5 | 2    | 874     |
| Sluice chambers of lock          | 2  | 7     | 16   | 2    | 419     |
| Ditto waste channel              | 2  | 13    | 9    | 2    | 168     |
| Total concrete                   |    |       |      |      | 12 108  |
| <i>Cut Stone work</i>            |    |       |      |      |         |
| Coping of parapets               |    | 331   | 2    | 0-5  | 331     |
| String course to ditto           |    | 181   | 1    | 0-5  | 92      |
| Faces of arches main bridge      |    | 40    | 15   | 15   | 90      |
| Seats for lock-gate pivots upper | 4  | 65    | 2    | 15   | 78      |
| Ditto lower gates                | 4  | 145   | 2    | 15   | 171     |
| Ditto sluice both gates          | 8  | 12    | 2    | 15   | 288     |
| Grooves in waste channels        | 4  | 65    | 2    | 10   | 52      |
| Ditto for mill sluices           | 12 | 65    | 1    | 0-5  | 39      |
| Total                            |    |       |      |      | 1 117   |
| <i>Dry Stone work</i>            |    |       |      |      |         |
| At least, say equal to           | 1  | 150   | 10   | 3    | 4 500   |
| At tail                          | 1  | 130   | 10   | 3    | 3,900   |
| Total Dry Stone-work             |    |       |      |      | 8 400   |
| <i>Wood work</i>                 |    |       |      |      |         |
| Lock gates, upper                | 4  | 11 33 | 0-6  | 6    | 170     |
| Ditto lower                      | 4  | 11 33 | 0-6  | 11   | 415     |
| Screen beams                     | 1  | 19    | 0-75 | 0-75 | 47      |
| Planks                           |    | 105   | 6    | 0-12 | 8       |
| Total Wood work                  |    |       |      |      | 619     |
| <i>Excavation</i>                |    |       |      |      |         |
| For lock say                     | 1  | 150   | 30   | 18   | 213 000 |
| Widening above lock              | 1  | 300   | 30   | 6    | 51 000  |
| Ditto below ditto                | 1  | 500   | 30   | 11   | 210 000 |
| Total Excavation                 |    |       |      |      | 474 000 |

## APPENDIX B.—DETAILED ESTIMATES OF 1861.

|                                                                                  | No. | L.          | B.       | D.      | Total    |
|----------------------------------------------------------------------------------|-----|-------------|----------|---------|----------|
| Brought forward ...                                                              | ... | .....       | .....    | .....   | 87,889   |
| Straight wing walls above ditto...                                               | 2   | 3           | 5        | 6       | 180      |
| Ditto ditto ...                                                                  | 2   | 8           | 4        | 8       | 512      |
| Ditto ditto ...                                                                  | 2   | 12          | 4        | 5       | 480      |
| Curved wing walls, including, as<br>2, the semi-circular wings of<br>channel ... | 6   | 3-14 × 13-5 | 2-5      | 11      | 6,991    |
| Distributing channel head, curtain<br>wall, upper ...                            | 2   | 12          | 2        | 6       | 288      |
| Ditto floor above bridge ...                                                     | 2   | 8           | 10 + 6   | 1-5     | 192      |
| Ditto abutments of bridge                                                        | 4   | 19          | 2        | 11      | 2,508    |
| Ditto tail curves ...                                                            | 4   | 3-14 × 13-5 | 3        | 10      | 3,391    |
| Tail curtain wall ...                                                            | 4   | 8           | 2        | 4       | 256      |
| Flooring ...                                                                     | 2   | 4           | 7        | 1-5     | 84       |
| Centre ditto ...                                                                 | 2   | 19          | 6        | 1-5     | 342      |
| Bridges taken solid ...                                                          | 2   | 19          | 8        | 4       | 1,216    |
| Parapets ...                                                                     | 2   | 12          | 1-5      | 3       | 216      |
| Centre walls of lock chamber ...                                                 | 2   | 105         | 9        | 13      | 24,570   |
| Side ditto ...                                                                   | 2   | 105         | 8        | 7       | 11,760   |
| Side walls of lock chambers ...                                                  | 2   | 105         | 5        | 6       | 6,300    |
| Buttresses ...                                                                   | 1-8 | 4           | 1 + 2    | 4       | 43       |
| Centre walls at recess of lock ...                                               | 2   | 12          | 8        | 13      | 2,496    |
| Side wall ditto ...                                                              | 2   | 12          | 8        | 13      | 2,496    |
| Centre walls under bridge ...                                                    | 2   | 19          | 9        | 17      | 5,814    |
| Side ditto ...                                                                   | 2   | 19          | 5        | 17      | 3,230    |
| Portion of ditto ...                                                             | 4   | 5           | 3        | 17      | 510      |
| Steps in front of bridge ...                                                     | 4   | 26          | 10       | 5 × 0-5 | 650      |
| Parapets to ditto ...                                                            | 2   | 10          | 1-5      | 3       | 180      |
| Bridges taken solid ...                                                          | 2   | 42          | 19       | 4       | 3,192    |
| Parapets ...                                                                     | 2   | 58          | 1-5      | 3       | 522      |
| Tail steps ...                                                                   | 4   | 26          | 9        | 3       | 5,148    |
| Parapets of ditto ...                                                            | 2   | 25          | 1-5      | 3       | 450      |
| Tail wings ...                                                                   | 2   | 3-14 × 0-5  | 27-5 × 5 | 20      | 8,635    |
| Deduct ...                                                                       | ... | ...         | ...      | ...     | 1,80,544 |
| Hollow under locks                                                               | 2   | 16          | 3        | 4       | 384      |
| Ditto in centre walls                                                            | 14  | 10          | 3        | 4       | 1,680    |
| Ditto ditto ...                                                                  | 14  | 10          | 2        | 3       | 840      |
| Total Masonry ...                                                                | ... | ...         | ...      | ...     | 2,904    |
| Concrete.                                                                        | ... | ...         | ...      | ...     | 1,77,640 |
| Lock chamber, to bridge...                                                       | 2   | 97          | 16       | 2       | 6,208    |
| Ste channel ...                                                                  | 1   | 56          | 9        | 2       | 1,008    |
| Lock chamber under bridges                                                       | 2   | 19          | 15-5     | 2       | 1,178    |
| Carried over ...                                                                 | ... | .....       | .. ..    | ...     | 8,394    |

|                                   | No. | L     | B    | D    | Total.  |
|-----------------------------------|-----|-------|------|------|---------|
| Brought forward ...               | ... | .     | .    |      | 8,391   |
| Lock chamber below tail floor ..  | 2   | 19    | 17   | 2    | 1,292   |
| Ditto tail of waste channel ...   | 1   | 19    | 9.5  | 2    | 361     |
| Sluice chamber .. ..              | 2   | 7     | 16   | 2    | 419     |
| Ditto in waste channel ...        | 1   | 13    | 10   | 2    | 260     |
| Total Concrete ...                |     |       | ...  |      | 10,753  |
| <i>Dry Stone-work.</i>            |     |       |      |      |         |
| At head say ... ..                | 1   | 110   | 10   | 3    | 4,200   |
| At tail ... ..                    | 1   | 120   | 10   | 3    | 3,600   |
| Total Stone work .                |     |       | ..   |      | 7,800   |
| <i>Wood-work</i>                  |     |       |      |      |         |
| Lock gates, upper. . . .          | 4   | 11 33 | 0.66 | 5    | 119     |
| Ditto lower .. . . .              | 4   | 11 33 | 0.66 | 13   | 389     |
| Screen beams . . . . .            | 8   | 19    | 0.75 | 0.75 | 85      |
| Planks for waste channel ..       | ... | 10.5  | 0    | 0.12 | 7       |
| Total .                           |     |       | ..   |      | 630     |
| <i>Excavation.</i>                |     |       |      |      |         |
| Lock excavation ... ..            | 1   | 150   | 75   | 17   | 191,250 |
| Widening channel, above ...       | 1   | 300   | 7.5  | 5    | 37,500  |
| Ditto below ... ..                | 1   | 500   | 7.5  | 13   | 195,000 |
| Total Excavation ...              | ... |       | ...  | ...  | 423,750 |
| <i>Cut Stone-work.</i>            |     |       |      |      |         |
| Coping of parapets ... ..         | ... | 210   | 2    | 0.5  | 240     |
| String course of ditto ...        | ... | 110   | 1    | 0.5  | 70      |
| Ditto of arches . . . . .         |     | 33    | 1.5  | 1.5  | 71      |
| Seats for lock gate pivots, upper | 4   | 35    | 1.5  | 1.5  | 42      |
| Ditto ditto, lower ...            | 4   | 115   | 1.5  | 1.5  | 158     |
| Ditto sills .. . . .              | 8   | 12    | 1.5  | 1.5  | 288     |
| Grooves in waste channel          | ... | 35    | 1.5  | 1.0  | 11      |
| Ditto for mill sluices . .        | 12  | 35    | 1    | 0.5  | 51      |
| Total Cut Stone-work              | ... |       | ...  | ..   | 857     |

## ABSTRACT.

|           |                                                                  |     |     |     |     |     |     |     | Rs.    |
|-----------|------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|--------|
| 423,750   | Cubic feet of excavation, at Rs. 6 per 1,000 cubic feet          | ... | ... | ... | ... | ... | ... | ... | 2,542  |
| 177,610   | Ditto masonry, at Rs. 15 per 100 cubic feet                      | ... | ... | ... | ... | ... | ... | ... | 26,646 |
| 89        | Blocks, sinking, at Rs. 50 each                                  | ... | ... | ... | ... | ... | ... | ... | 4,450  |
| 89        | Ditto, curbs, at Rs. 25 each                                     | ... | ... | ... | ... | ... | ... | ... | 2,225  |
| 7,800     | Cubic feet dry stone-work, at Rs. 8 per 100 cubic feet           | ... | ... | ... | ... | ... | ... | ... | 624    |
| 887       | Ditto cut-stone work, extra charge, at Rs. 30 per 100 cubic feet | ... | ... | ... | ... | ... | ... | ... | 266    |
| 10,755    | Ditto concrete, at Rs. 12 per 100 cubic feet                     | ... | ... | ... | ... | ... | ... | ... | 1,291  |
| 630       | Ditto wood-work, at Rs. 5 per cubic foot                         | ... | ... | ... | ... | ... | ... | ... | 3,150  |
| 10        | Drum shutes, at Rs. 100 each                                     | ... | ... | ... | ... | ... | ... | ... | 1,000  |
|           | Contingencies at 5 per cent.                                     | ... | ... | ... | ... | ... | ... | ... | 2,109  |
| Total Rs. |                                                                  |     |     |     |     |     |     |     | 44,303 |

If the soil be such as not to render block-sinking necessary, the following reductions may be made:—

|                                                               |     |     |     |     |     |     |     |     | Rs.    |
|---------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| Two-thirds of the masonry in blocks, or say 27,500 cubic feet | ... | ... | ... | ... | ... | ... | ... | ... | 4,125  |
| Curbs for blocks                                              | ... | ... | ... | ... | ... | ... | ... | ... | 1,780  |
| Sinking ditto                                                 | ... | ... | ... | ... | ... | ... | ... | ... | 3,560  |
| Half the concrete                                             | ... | ... | ... | ... | ... | ... | ... | ... | 645    |
| Contingencies                                                 | ... | ... | ... | ... | ... | ... | ... | ... | 505    |
| Total reduction                                               |     |     |     |     |     |     |     |     | 10,615 |

Leaving the cost of each double lock with single waste channel, Rs. 33,688

## D. Mills.

|                                                    | No. | L   | B   | D   | Total |
|----------------------------------------------------|-----|-----|-----|-----|-------|
| <i>Masonry.</i>                                    |     |     |     |     |       |
| Waste channel walls ...                            | 2   | 60  | 2   | 56  | 1,500 |
| Ditto floor ...                                    | 1   | 60  | 6   | 15  | 510   |
| Ditto arches ...                                   | 1   | 60  | 6   | 2   | 720   |
| Drain channel walls ...                            | 2   | 25  | 2   | 6   | 600   |
| Ditto floor ...                                    | 1   | 25  | 1   | 15  | 150   |
| Ditto arches ...                                   | 1   | 25  | 4   | 2   | 200   |
| Mill chamber walls, foundation ...                 | 2   | 215 | 25  | 25  | 306   |
| Ditto ditto ...                                    | 1   | 205 | 25  | 25  | 519   |
| Ditto plinth ...                                   | 2   | 21  | 2   | 15  | 432   |
| Ditto ditto ...                                    | 4   | 21  | 2   | 45  | 756   |
| Ditto superstructure ...                           | 1   | 23  | 15  | 75  | 1,035 |
| Ditto ditto ...                                    | 1   | 21  | 15  | 75  | 915   |
| Flooring below mill wheels ...                     | 6   | 5   | 35  | 15  | 157   |
| Ditto of mill chamber ...                          | 2   | 21  | 20  | 10  | 810   |
| Partition walls ...                                | 8   | 35  | 1   | 35  | 98    |
| Steps, back wall ...                               | 1   | 75  | 25  | 60  | 112   |
| Ditto and arch, equal to ...                       | 1   | 7   | 75  | 25  | 131   |
| Flooring below steps ...                           | 1   | 7   | 50  | 15  | 62    |
| Total ...                                          | ... | ... | ... | ... | 9,117 |
| Deduct doors ...                                   | 2   | 65  | 4   | 15  | 74    |
| Total Masonry ...                                  | ... | ... | ... | ... | 9,069 |
| Roofing, including wood work, superficial feet ... | 2   | 21  | 20  |     | 810   |
| Doors ...                                          | 2   | 65  | 4   |     | 62    |
| Bets of Mill Machinery ...                         | 6   |     |     |     |       |

## ABSTRACT.

|                                                    |           |
|----------------------------------------------------|-----------|
| 9069 Cubic feet of masonry, at Rs. 15 per 100 ..   | 1,360     |
| 810 Superficial feet roofing, at Rs. 40 per 100 .. | 326       |
| 62 Ditto doors, at Rs. 1 per foot ...              | 62        |
| 6 Bets of mill machinery, at Rs. 50 each ...       | 300       |
| Contingencies at 5 per cent. ...                   | 102       |
| Total 2 Mills, with 6 stones in all ..             | Rs. 2,150 |

## ESTIMATE No. 11, LOCKS AND MILLS.

*E. Small locks 60×10 for the minor channels.*

|                                                                                   | No. | L.          | B.         | D.    | Total. |
|-----------------------------------------------------------------------------------|-----|-------------|------------|-------|--------|
| <i>Masonry.</i>                                                                   |     |             |            |       |        |
| Straight portion (7·5 + 60 + 19)<br>of walls of lock chamber, deep<br>part ... .. | 2   | 82          | 5          | 15    | 12,300 |
| Ditto shallow part ... ..                                                         | 2   | 4·5         | 5          | 15    | 675    |
| Deep portion waste channel wall...                                                | 1   | 40          | 5          | 15    | 3,000  |
| Shallow portion ... ..                                                            | 1   | 46·5        | 3          | 7     | 977    |
| Upper wings ... ..                                                                | 2   | 3·1416<br>2 | 13×2       | 7     | 572    |
| Lower ditto ... ..                                                                | 2   | 3·1416<br>2 | 21·5×5     | 13    | 4,390  |
| Head of centre wall ... ..                                                        | 1   | 3           | 5          | 7     | 105    |
| Tail steps of ditto ... ..                                                        | 1   | 20×0·5      | 12         | 5     | 600    |
| Flooring lock chamber ... ..                                                      | 1   | 86·5        | 10         | 3     | 2,595  |
| Ditto of waste chamber ... ..                                                     | 1   | 86·5        | 6          | 3     | 1,557  |
| Ditto of tail wings ... ..                                                        | 1   | 20          | 60+21<br>2 | 2     | 1,620  |
| Curtain walls above lock and waste<br>chamber ... ..                              | 1   | 16          | 3          | 2     | 96     |
| Ditto for drops in ditto ... ..                                                   | 1   | 16          | 8          | 3     | 394    |
| Ditto below tail ... ..                                                           | 1   | 60          | 4          | 2     | 480    |
| Walls of sluice recess below lock                                                 | 2   | 18          | 4          | 3     | 432    |
| Ditto ditto ditto ... ..                                                          | 2   | 5           | 4          | 3     | 120    |
| Ditto ditto in waste channel ...                                                  | 1   | 9           | 3          | 3     | 81     |
| Ditto ditto ditto ... ..                                                          | 2   | 5           | 3          | 3     | 90     |
| Main bridge, both channels, taken<br>solid from spring ... ..                     | 1   | 10+6        | 19         | 4     | 1,216  |
| Mill bridge ... ..                                                                | 1   | 6           | 6          | 4     | 144    |
| Upper lock ditto ... ..                                                           | 1   | 6           | 6          | 4     | 144    |
| Parapets of main bridge... ..                                                     | 2   | 21          | 1·5        | 3·5   | 121    |
| Dwarf pillars at ends ... ..                                                      | 4   | 2           | 2          | 3·5   | 56     |
| Total ... ..                                                                      | ... | ...         | ...        | ...   | 31,755 |
| Deduct hollows for upper gates ...                                                | 2   | 7·5         | 1          | 4     | 60     |
| Ditto lower ditto ... ..                                                          | 2   | 7·5         | 1          | 12    | 180    |
| Total deducted ... ..                                                             | ... | ...         | ...        | ...   | 240    |
| Total Masonry ... ..                                                              | ... | ...         | ...        | ...   | 31,515 |
| <i>Dry Stone-work.</i>                                                            |     |             |            |       |        |
| At head ... ..                                                                    | 1   | 30          | 10         | 2     | 600    |
| At tail ... ..                                                                    | 1   | 60          | 15         | 2·5   | 2,500  |
| Total Dry Stone-work ..                                                           | ... | .....       | .....      | ..... | 2,250  |

|                                   | No  | L    | B.    | D.    | Total. |
|-----------------------------------|-----|------|-------|-------|--------|
| <i>Cut Stone work.</i>            |     |      |       |       |        |
| Seat for pivots, upper gates ...  | 100 | 4    | 2     | 15    | 21     |
| Ditto lower ditto ...             | 100 | 12   | 2     | 15    | 72     |
| Ditto sill, upper and lower gates | 4   | 7-25 | 2     | 15    | 87     |
| Coping of parapets ...            | ... | 60   | 2-0   | 0-5   | 60     |
| String course of ditto ...        | ... | 60   | 1-0   | 0-5   | 25     |
| Faces of arches, 10 feet span     | ... | 12   | 1-0   | 15    | 36     |
| Ditto 6 ditto ...                 | 6   | 7    | 1-0   | 15    | 63     |
| Grooves for waste channel ...     | 12  | 4    | 1-0   | 0-5   | 4      |
| Ditto mill sluices .              | 6   | 4    | 1-0   | 0-5   | 12     |
| Total Cut Stone work              | ... | .    | ..... | ..    | 373    |
| Excavation ...                    | 1   | 90   | 30    | 15    | 40,500 |
| <i>Wood-work.</i>                 |     |      |       |       |        |
| Upper gates .                     | 2   | 7-25 | 0-33  | 4     | 19     |
| Lower ditto ...                   | 2   | 7-25 | 0-50  | 12    | 87     |
| Screen beams ...                  | 4   | 17   | 0-50  | 0-50  | 13     |
| Planks for waste channel ...      | 1   | 65   | 4     | 0-083 | 2      |
| Total Wood work                   | ... | .    | ...   | ..... | 121    |

## ABSTRACT.

|           |                                                         | R.        |
|-----------|---------------------------------------------------------|-----------|
| 31,515    | Cubic feet of masonry, at Rs. 15 per 100 cubic feet ... | 4,727     |
| 40,500    | Ditto excavation, at Rs. 5 per 1,000 cubic feet ...     | 202       |
| 2,850     | Ditto dry stone work, at Rs. 8 per 100 cubic feet ...   | 228       |
| 373       | Ditto cut stone work, at Rs. 30 per 100 cubic feet ...  | 112       |
| 121       | Ditto wood work, at Rs. 5 per cubic foot ...            | 605       |
| 5         | Small drum sluices, at Rs. 30 each ..                   | 150       |
|           | Contingencies at 5 per cent. ...                        | 301       |
| Total ... |                                                         | Rs. 6,325 |

## No. 12, BARRIER BRIDGES.

A. *For Wings with semi-arches.*

|                                                                 | No. | L.                       | B.   | D.  | Total. |
|-----------------------------------------------------------------|-----|--------------------------|------|-----|--------|
| <i>Masonry.</i>                                                 |     |                          |      |     |        |
| Curved quadrantal wings, foundation ... ..                      | 9   | 10.75 × 3.14 × 0.5 × 3.5 |      | 6   | 3,190  |
| Ditto superstructure ... ..                                     | 9   | 10.5 × 3.14 × 0.5 × 3    |      | 7.5 | 3,338  |
| Curved projection inside of lock channel head, foundation ...   | 2   | 4.75 × 3.14 × 0.75 × 3.5 |      | 6   | 466    |
| Ditto superstructure ... ..                                     | 2   | 4.5 × 3.14 × 0.75 × 3    |      | 7.5 | 477    |
| Sides of lock channel head and abutment of bridge, foundation.. | 6   | 31                       | 3.5  | 6   | 3,906  |
| Ditto superstructure ... ..                                     | 6   | 31                       | 3    | 7.5 | 4,185  |
| Floor of lock channel head ...                                  | 2   | 31                       | 17   | 1.5 | 1,581  |
| Curtain wall of lock channel ...                                | 4   | 17                       | 2    | 4.5 | 612    |
| Ditto of half-span of bridge ...                                | 4   | 2.5                      | 2    | 6.0 | 120    |
| Floor of ditto ... ..                                           | 2   | 13                       | 2.5  | 1.5 | 97     |
| Halfarches taken solid from spring                              | 2   | 15                       | 3    | 3   | 270    |
| Parapets of ditto ... ..                                        | 4   | 3                        | 1.5  | 2.5 | 45     |
| Corner pillars ... ..                                           | 4   | 2                        | 2    | 2.5 | 40     |
| Total Masonry ... ..                                            | ... | ...                      | ...  | ... | 18,327 |
| <i>Cut Stone-work.</i>                                          |     |                          |      |     |        |
| Coping pillars ... ..                                           | 4   | 2.5                      | 2.5  | 0.5 | 12     |
| Ditto parapets ... ..                                           | 4   | 3                        | 1.75 | 0.5 | 11     |
| Arch, faces ... ..                                              | 2   | 7                        | 1.5  | 1.5 | 31     |
| Total Cut-stone ... ..                                          | ... | ...                      | ...  | ... | 54     |

## ABSTRACT.

|                                                            |     |     |     | Rs.   |
|------------------------------------------------------------|-----|-----|-----|-------|
| 18,327 Cubic feet of masonry, at Rs. 15 per 100 cubic feet | ... | ... |     | 2,749 |
| 54 Ditto cut-stone, at Rs. 30 per 100 cubic feet extra     | ... | ..  |     | 16    |
| Contingencies at 5 per cent. ... ..                        | ... | ... | ... | 138   |
| Total ... Rs.                                              |     |     |     | 2,903 |



## B Pier with two semi-arches

|                                      | No | L  | B   | D  | Total |
|--------------------------------------|----|----|-----|----|-------|
| <i>Masonry</i>                       |    |    |     |    |       |
| Per foundation                       | 1  | 17 | 3   | 6  | 306   |
| Ditto superstructure taken square    | 1  | 17 | 2   | 6  | 170   |
| Curtain wall of one span             | 2  | 5  | 2   | 6  | 120   |
| Flooring ditto                       | 1  | 13 | 6   | 15 | 97    |
| All above spring of arch taken solid | 1  | 15 | 8   | 3  | 360   |
| Parapets                             | 2  | 8  | 15  | 25 | 60    |
| Total Masonry                        |    |    |     |    | 1113  |
| <i>Cut Stone-work</i>                |    |    |     |    |       |
| Parapets, coping                     | 2  | 8  | 175 | 05 | 11    |
| String course                        | 2  | 8  | 05  | 05 | 4     |
| Liers, caps                          | 2  | 2  | 2   | 1  | 8     |
| Arch faces                           | 2  | 7  | 15  | 15 | 31    |
| Total Cut Stone work                 |    |    |     |    | 57    |

## ABSTRACT

|                                                         |         |
|---------------------------------------------------------|---------|
| 1113 Cubic feet of masonry at Rs. 15 per 100 cubic feet | Rs. 167 |
| 57 Ditto extra cut-stone at Rs. 30 per 100 cubic feet   | 17      |
| Contingencies at 5 per cent.                            | 9       |
| Total                                                   | Rs. 193 |

## GENERAL ABSTRACT

|                                                              | Amount taken<br>in General<br>Estimate |       |
|--------------------------------------------------------------|----------------------------------------|-------|
|                                                              | Rs.                                    | Rs.   |
| Lock heads with wing walls and one span of bridge Abstract A | 2,900                                  | 2,900 |
| Add for 1 span as per Abstract B                             | 100                                    |       |
| Total 2 spans                                                | 3,000                                  | 3,100 |
| Add for 1 span, as per Abstract B                            | 100                                    |       |
| Total 3 spans                                                | 3,200                                  | 3,300 |
| Add for 1 span as per Abstract B                             | 100                                    |       |
| Total 4 spans                                                | 3,400                                  | 3,500 |
| Add for 1 span as per Abstract B                             | 100                                    |       |
| Total 5 spans                                                | 3,600                                  | 3,700 |

## No. 13, BRIDGES.

## A. Designs Nos. I. and III.

## a. Abutments with two semi-arches.

|                                                               | No.   | L.                                   | B.                            | D.                           | Total. |
|---------------------------------------------------------------|-------|--------------------------------------|-------------------------------|------------------------------|--------|
| <i>Masonry.</i>                                               |       |                                      |                               |                              |        |
| Foundation blocks ... ..                                      | 8     | (8×7-5×4)                            |                               | 12                           | 3,456  |
| Ditto ... ..                                                  | 12    | (12×7-9×4)                           |                               | 12                           | 6,912  |
| Ditto ... ..                                                  | 4     | (13×7-10×4)                          |                               | 12                           | 2,448  |
| Flooring over all as far as back of abutments ... ..          | 2     | 26·5                                 | 33                            | 2                            | 3,498  |
| Ditto over blocks supporting steps                            | 8     | 12                                   | 7                             | 2                            | 1,344  |
| Abutments up to level of tow-path ... ..                      | 2     | 19                                   | 16                            | 10                           | 6,080  |
| Ditto next portion above ... ..                               | 2     | 19                                   | 10                            | 4                            | 1,520  |
| Ditto back of spring of arch ... ..                           | 2     | 19                                   | $\frac{8+6}{2}$               | 4                            | 1,064  |
| Ditto back of spandril ... ..                                 | 2     | 19                                   | 4                             | 4                            | 608    |
| Wing walls, first ... ..                                      | 4     | $\frac{3-1416}{6} \times 28 \cdot 5$ | 3                             | 18                           | 3,222  |
| Ditto second ... ..                                           | 4     | $\frac{3-1416}{6} \times 28$         | 2                             | 14                           | 1,642  |
| Ditto square ends ... ..                                      | 4     | 3                                    | 3                             | 14                           | 504    |
| Over steps of abutment ... ..                                 | 4     | 2                                    | 3                             | 10                           | 240    |
| Ditto ... ..                                                  | 4     | 2                                    | 3                             | 6                            | 144    |
| Ditto ... ..                                                  | 4     | 8                                    | 3                             | 2                            | 192    |
| Cutwaters of abutments... ..                                  | 4     | $\frac{2}{3} \times 7$               | 6                             | 15                           | 1,680  |
| Caps over ditto ... ..                                        | 4     | $\frac{2}{3} \times 6$               | $\frac{4}{3}$                 | 2                            | 64     |
| Starlings .. ..                                               | 4     | 0·7854                               | $6 \times 6 \times 0 \cdot 5$ | 9                            | 509    |
| Two semi-arches ... ..                                        | 1     | 37·5                                 | 19                            | 3                            | 2,137  |
| Two semi-spandrills ... ..                                    | 1     | (36·6×9-152)                         |                               | 19                           | 3,363  |
| Parapets over semi-arches ... ..                              | 4     | 16·5                                 | 1·5                           | 3·5                          | 346    |
| Ditto starlings ... ..                                        | 4     | $\frac{3-1416}{2}$                   | 6                             | $1 \cdot 5 \times 3 \cdot 5$ | 198    |
| Ditto wing walls ... ..                                       | 4     | $\frac{3-1416}{3}$                   | 27·75                         | $1 \cdot 5 \times 3 \cdot 5$ | 605    |
| Ditto dwarf pillars ... ..                                    | 4     | 3                                    | 3                             | 3·5                          | 126    |
| Steps adjoining towing path ... ..                            | 4     | 10                                   | $\frac{17+6}{2}$              | 10                           | 4,600  |
| And ... ..                                                    | 4     | 16                                   | $\frac{17+6+2}{3}$            | 10                           | 5,333  |
|                                                               |       |                                      |                               |                              | 51,835 |
| Deduct—Hollow under tow path                                  | 2     | 19                                   | 3·5                           | 6                            | 798    |
| Step in back of abutment, included in spandril and wing walls | 2     | 19                                   | 4                             | 2                            | 304    |
|                                                               |       |                                      |                               |                              | 1,102  |
| Total Masonry . ...                                           | ..... | .....                                | .....                         | .....                        | 50,723 |

|                                                    | No.   | L.                  | B.                | D.        | Total.  |
|----------------------------------------------------|-------|---------------------|-------------------|-----------|---------|
| <i>Earth-work.</i>                                 |       |                     |                   |           |         |
| Approaches, average section ...                    | 2     | 450 × $\frac{1}{2}$ | $\frac{20+70}{2}$ | 15        | 303,750 |
| Raising side ramps ...                             | 4     | 220 × $\frac{1}{2}$ | $\frac{20+70}{2}$ | 11        | 217,500 |
| These will more than cover extra width of channel. |       |                     |                   | Total ... | 521,250 |
| <i>Metalling.</i>                                  |       |                     |                   |           |         |
| Over semi-arches and abutments...                  | 2     | 161 × 6             | 16                | 0.5       | 360     |
| Between wing walls ...                             | 2     | 22                  | $\frac{39+16}{2}$ | 0.5       | 594     |
| Total Metalling ...                                | ..... | ..                  | ..                | .....     | 954     |
| <i>Cut Stone-work.</i>                             |       |                     |                   |           |         |
| Coping of parapets (total length)                  | ..... | 232                 | 2                 | 0.5       | 232     |
| String course below ditto ..                       | ..    | 232                 | 1.0               | 0.5       | 116     |
| Do. round heads of abutments ...                   | 2     | 16                  | 1.0               | 0.5       | 66      |
| Do. in wing walls to correspond..                  | 4     | 30                  | 1.0               | 0.5       | 60      |
| Facing of semi-arches ...                          | 2     | 37.5                | 2.0               | 3.0       | 450     |
| Total ..                                           | ..... | .....               | .....             | .....     | 914     |

## ABSTRACT.

|                                                                     | Ra.        |
|---------------------------------------------------------------------|------------|
| 5,21,550 Cubic feet of earth-work, at Ra. 3 per 1,000 cubic feet... | 1,565      |
| 49,680 Ditto masonry, at Ra. 15 per 100 cubic feet ...              | 7,287      |
| 2,137 Ditto ditto in arch, at Ra. 25 per 100 cubic feet ..          | 531        |
| 24 Blocks, sinking, at Ra. 50 each ...                              | 1,200      |
| 24 Curbs for blocks, at Ra. 25 each ...                             | 600        |
| 914 Cubic feet cut stone-work (extra charge) at Ra. 30 per 100 ..   | 274        |
| 954 Ditto metalling, at Ra. 6 per 100 cubic feet ...                | 57         |
| Contingencies at 5 per cent....                                     | 575        |
| Total cost of one span of 33 feet ...                               | Ra. 12,092 |

If under-runk foundations be not necessary, the following reductions may be made:—

|                                                                              |       |
|------------------------------------------------------------------------------|-------|
| Half the masonry in blocks, or say 6,400 cubic feet, at Ra. 15 per 100 ..Ra. | 920   |
| Sinking blocks ...                                                           | 1,200 |
| Curb frames ...                                                              | 600   |
| Contingencies ...                                                            | 154   |
| Total reduction ...                                                          | 2,874 |
| Leaving the cost of the one span of 33 feet ...Ra.                           | 9,194 |

No. 13, BRIDGES.

A. Designs Nos. I. and III.

b. Pier with two semi-arches.

|                                              | No. | L.                     | B.              | D.  | Total. |
|----------------------------------------------|-----|------------------------|-----------------|-----|--------|
| <i>Masonry.</i>                              |     |                        |                 |     |        |
| Foundation Blocks ... ..                     | 2   | (8×7-5×4)              |                 | 12  | 864    |
| Ditto ... ..                                 | 4   | (12×7-9×4)             |                 | 12  | 2,304  |
| Ditto ... ..                                 | 2   | (13×7-10×4)            |                 | 12  | 1,224  |
| Flooring over all ... ..                     | 1   | 39                     | 33              | 2   | 2,574  |
| Pier ... ..                                  | 1   | 19                     | 6               | 15  | 1,710  |
| Ditto between skew backs ...                 | 1   | 19                     | $\frac{6+2}{2}$ | 2.5 | 190    |
| Cut-waters ... ..                            | 2   | $\frac{2}{3} \times 7$ | 6               | 15  | 840    |
| Caps over cut-waters ... ..                  | 2   | $\frac{2}{3}$          | $\frac{6+4}{2}$ | 2   | 32     |
| Starlings ... ..                             | 2   | $\frac{0.7854}{2}$     | 6×6             | 9   | 254    |
| 2 semi-arches as in a. ... ..                | ... | .....                  | ...             | ... | 2,137  |
| 2 semi-spandrills as ditto... ..             | ... | .....                  | ...             | ... | 3,363  |
| Span between spandrills ... ..               | 1   | 19                     | 6.5             | 2   | 247    |
| Parapets over arch ... ..                    | 2   | 33                     | 1.5             | 3.5 | 346    |
| Ditto over starlings ... ..                  | 2   | $\frac{3.1416}{2}$     | 6×1.5           | 3.5 | 99     |
| Total ... ..                                 | ... | .....                  | ...             | ... | 16,184 |
| <i>Cut Stone-work.</i>                       |     |                        |                 |     |        |
| Coping of parapets (see length above) ... .. | ..  | 85                     | 2.0             | 0.5 | 85     |
| String course under ditto ... ..             | ... | 85                     | 1.0             | 0.5 | 42.5   |
| Ditto round pier ... ..                      | 2   | 33                     | 1.0             | 0.5 | 33     |
| Facing of semi-arches ... ..                 | 2   | 37.5                   | 2.0             | 3.0 | 450    |
| Total ... ..                                 | ... | .....                  | ...             | ... | 610    |
| Metalling ... ..                             | 1   | 39                     | 16              | 0.5 | 312    |

ABSTRACT.

|        |                                                            |     |     |     | Rs.   |
|--------|------------------------------------------------------------|-----|-----|-----|-------|
| 14,047 | Cubic feet of masonry, at Rs. 15 per 100 cubic feet        | ... | ... |     | 2,107 |
| 2,137  | Ditto ditto in arch, at Rs. 25 per 100 cubic feet          | ... | ... |     | 534   |
| 8      | Blocks, curb frames, at Rs. 25 each                        | ... | ... | ... | 200   |
| 8      | Ditto, sinking, at Rs. 50 each                             | ... | ... | ... | 400   |
| 610    | Cubic feet of cut stone-work, at Rs. 30 per 100 cubic feet | ... | ... |     | 183   |
| 312    | Ditto metalling, at Rs. 6 per 100 cubic feet               | ... | ... |     | 19    |
| .      | Contingencies at 5 per cent.                               | ... | ... | ... | 172   |
| Total  |                                                            |     |     | Rs. | 3,615 |

If block sinking should not be necessary, the following reductions may be made —

|                                                                        |     |
|------------------------------------------------------------------------|-----|
| Half the masonry in blocks, or say 2,000 cubic feet, at Rs. 15 per 100 | 300 |
| Curbs for blocks .. .. .                                               | 200 |
| Sinking ditto .. .. .                                                  | 400 |
| Contingencies at 5 per cent .. .. .                                    | 45  |
| Total .. .. .                                                          | 945 |

Leaving the cost of pier and two semi spans Rs. 2670

### GENERAL ABSTRACT

| No. of Spans                                          | With cost of block sinking | Without cost of block sinking | Average. | Amount used in General Estimate |
|-------------------------------------------------------|----------------------------|-------------------------------|----------|---------------------------------|
| One span (as per Abstract a)<br>All as per Abstract b | 12,092<br>3,615            | 9,194<br>2,670                | 10,643   |                                 |
| Two spans as in design No. III ..<br>All again ..     | 16,707<br>3,615            | 11,804<br>2,670               | 13,785   | 15,500                          |
| Three spans as in design No. I ..<br>All again ..     | 19,322<br>3,615            | 14,534<br>2,670               | 16,929   | 19,000                          |
| Four spans as in Tootla drainage ..<br>All again ..   | 22,937<br>3,615            | 17,204<br>2,670               | 20,066   |                                 |
| Five spans as in deep cutting west<br>Chasseram       | 26,552                     | 19,874                        | 23,213   | 26,500                          |

For the bridges of 3, 4, and 5 spans I have made no deduction, in anticipation of being able to save block sinking in the foundations, as the cutting is generally deep, and springs are therefore likely to be met with. The bridges of 5 spans in the deep cutting will have higher piers, as shown in the elevation in Plate XX., but as the abutment foundations will, under that arrangement, be laid down on a saving nearly equal to the cost of raising the piers, no alteration is made in the estimate on that account.

## No. 13, BRIDGES.

## B. DESIGNS II. AND VI.

*a. Abutments with two semi-arches.*

|                                                                   | No. | L.                                         | B.                 | D.  | Total. |
|-------------------------------------------------------------------|-----|--------------------------------------------|--------------------|-----|--------|
| <i>Masonry.</i>                                                   |     |                                            |                    |     |        |
| Foundation blocks ... ..                                          | 8   | (8 × 7 - 5 × 4)                            |                    | 12  | 3,456  |
| Ditto ... ..                                                      | 16  | (9 × 7 - 6 × 4)                            |                    | 12  | 7,488  |
| Ditto (No. 4 × 1½ =)                                              | 6   | (13 × 7 - 10 × 4)                          |                    | 12  | 3,672  |
| Flooring to back of abutment ...                                  | 2   | 18·5 + 11                                  | 33                 | 2   | 3,894  |
| Ditto over blocks for steps ...                                   | 12  | 9                                          | 7                  | 2   | 1,512  |
| Abutments up to top of tow-paths                                  | 2   | 19                                         | 17                 | 8   | 5,168  |
| Ditto next portion ... ..                                         | 2   | 19                                         | 11                 | 3   | 1,254  |
| Ditto above that ... ..                                           | 2   | 19                                         | 9                  | 1·5 | 513    |
| Ditto behind skew back ...                                        | 2   | 19                                         | $\frac{9+7}{2}$    | 2·5 | 760    |
| Ditto behind spandrill ...                                        | 2   | 19                                         | 4                  | 6   | 912    |
| Wing walls, first ... ..                                          | 4   | $\frac{3 \cdot 1416}{6} \times 26$         | 3                  | 18  | 2,940  |
| Ditto second ... ..                                               | 4   | $\frac{3 \cdot 1416}{6} \times 25 \cdot 5$ | 2                  | 14  | 1,495  |
| Ditto third ... ..                                                | 4   | 3                                          | 3                  | 14  | 504    |
| Ditto over steps of abutment                                      | 4   | 2                                          | 3                  | 12  | 288    |
| Ditto ditto ditto                                                 | 4   | 3                                          | 3                  | 8   | 288    |
| Ditto ditto ditto                                                 | 4   | 11                                         | 3                  | 2   | 264    |
| Cut-waters of abutments ... ..                                    | 4   | $\frac{2}{3} \times 7$                     | 6                  | 15  | 1,680  |
| Caps over ditto ... ..                                            | 4   | $\frac{2}{3} \times 6$                     | $\frac{4}{3}$      | 2   | 64     |
| Starlings ... ..                                                  | 4   | 0·7854                                     | 6 × 6 × 0·5        | 9   | 509    |
| Two semi-arches ... ..                                            | ... | 42·7                                       | 19                 | 3   | 2,433  |
| Two semi-spandrills ... ..                                        | ... | (9·7 × 40·6 - 213)                         |                    | 19  | 3,435  |
| Parapets over semi-arches ...                                     | 4   | 18·5                                       | 1·5                | 3·5 | 388    |
| Ditto starlings ... ..                                            | 4   | $\frac{3 \cdot 1416}{2}$                   | 6 × 1·5            | 3·5 | 197    |
| Ditto wing walls ... ..                                           | 4   | $\frac{3 \cdot 1416}{3}$                   | 25·25 × 1·5        | 3·5 | 556    |
| Ditto dwarf pillars ... ..                                        | 4   | 3                                          | 3                  | 3·5 | 126    |
| Steps adjoining towing path, say                                  | 4   | 10                                         | $\frac{14+2}{2}$   | 8   | 2,560  |
| Ditto ditto ditto ... ..                                          | 4   | 18                                         | $\frac{14+2+2}{3}$ | 8   | 3,456  |
| Total ... ..                                                      | ... | ...                                        | ...                | ... | 49,612 |
| Deduct, Hollows under tow-paths                                   | 2   | 19                                         | 4                  | 4   | 608    |
| Steps between wing walls included in spandrill and wing walls ... | 2   | 19                                         | 7                  | 2   | 632    |
| Total deductions ... ..                                           | ... | ...                                        | ...                | ... | 1,240  |
| Total Masonry ... ..                                              | ... | ...                                        | ...                | ... | 48,372 |

|                                                       | No | L.              | B                 | D   | Total.   |
|-------------------------------------------------------|----|-----------------|-------------------|-----|----------|
| <i>Earth work.</i>                                    |    |                 |                   |     |          |
| In approaches                                         | 2  | $\frac{450}{2}$ | $\frac{20+70}{2}$ | 15  | 303.750  |
| In railings & ramps                                   | 4  | $\frac{200}{2}$ | $\frac{20+70}{2}$ | 11  | 217.800  |
| These will more than cover the extra width of channel |    |                 |                   |     |          |
| Total Earth work                                      |    |                 |                   |     | 5,215.50 |
| <i>Masonry</i>                                        |    |                 |                   |     |          |
| Over semi arches and abutments                        | 2  | 185+6           | 10                | 0.5 | 390      |
| Between wing walls                                    | 2  | 24              | $\frac{44+18}{2}$ | 0.5 | 700      |
| Total                                                 |    |                 |                   |     | 1110     |
| <i>Cut Stone-work</i>                                 |    |                 |                   |     |          |
| Coping of parapets (total length)                     |    | 230             | 2                 | 0.5 | 230      |
| String course below litto                             |    | 230             | 1                 | 0.5 | 115      |
| Ditto round heads of abutments                        | 2  | 56              | 1                 | 0.5 | 56       |
| Ditto in wing walls to correspond                     | 4  | 30              | 1                 | 0.5 | 60       |
| Faces of semi arches                                  | 2  | 407             | 2                 | 3   | 512      |
| Total Cut stone                                       |    |                 |                   |     | 973      |

## ABSTRACT

|                                                               | La.  |
|---------------------------------------------------------------|------|
| 5*1,550 Cubic feet of earth work at Rs. 3 per 1000 cubic feet | 1550 |
| 4,530 Ditto masonry at Rs. 15 per 100 cubic feet              | 6800 |
| 2173 Ditto ditto in arch at Rs. 25 per 100 cubic feet         | 600  |
| 70 Blocks curb frames at Rs. 25 each                          | 1750 |
| 77 Ditto sinking at Rs. 50 each                               | 3850 |
| 973 Cubic feet cut stone-work at 1 La. 30 per 100 cubic feet  | 2919 |
| 1112 Ditto metal n. at 1 La. 6 per 100 cubic feet             | 667  |
| Contingencies at 5 per cent                                   | 555  |

Total cost of one span of 37 feet La. 10,350

If under-sunk foundations are not required, the following reductions may be made —

|                                                                                | La.  |
|--------------------------------------------------------------------------------|------|
| Half the masonry in blocks or say 7000 cubic feet at Rs. 15 per 100 cubic feet | 1050 |
| Sinking blocks                                                                 | 1500 |
| Curbs for litto                                                                | 750  |
| Contingencies                                                                  | 165  |

Total La. 3450

Leaving the cost of 1 span of 27 feet La. 6850

## No. 13, BRIDGES.

## C. DESIGNS NOS. IV. AND VII.

*a. Abutments with two semi-arches.*

|                                                                                  | No. | L.                                  | D.                 | B.  | Total. |
|----------------------------------------------------------------------------------|-----|-------------------------------------|--------------------|-----|--------|
| <i>Masonry.</i>                                                                  |     |                                     |                    |     |        |
| Foundation blocks ... ..                                                         | 8   | (11×7—8×4)                          |                    | 12  | 4,320  |
| Ditto .. ..                                                                      | 7   | (13×7—10×4)                         |                    | 12  | 2,448  |
| Ditto ... ..                                                                     | 4   | (15×7—12×4)                         |                    | 12  | 2,736  |
| Flooring over all as far as back<br>of abutments ... ..                          | 2   | 24½                                 | 30                 | 2   | 2,940  |
| Ditto over blocks supporting steps                                               | 8   | 11                                  | 7                  | 2   | 1,232  |
| Abutments up to level of tow<br>path ... ..                                      | 2   | 19                                  | 15                 | 7   | 3,990  |
| Ditto next portion above... ..                                                   | 2   | 19                                  | 9                  | 4   | 1,368  |
| Ditto ditto ... ..                                                               | 2   | 19                                  | 7                  | 2½  | 621    |
| Ditto at back of spring of arch...                                               | 2   | 19                                  | $\frac{7+6}{2}$    | 1½  | 494    |
| Ditto at back of spandril                                                        | 2   | 19                                  | 3½                 | 4   | 570    |
| Wing walls, first ... ..                                                         | 4   | $\frac{3 \cdot 1416}{6} \times 28$  | 3                  | 18  | 3,169  |
| Ditto second ... ..                                                              | 4   | $\frac{3 \cdot 1416}{6} \times 27½$ | 2                  | 14  | 1,613  |
| Ditto square ends... ..                                                          | 4   | 3                                   | 3                  | 14  | 504    |
| Ditto over steps of abutments ...                                                | 4   | 2                                   | 3                  | 10  | 240    |
| Ditto ditto ... ..                                                               | 4   | 2                                   | 3                  | 6   | 144    |
| Ditto ditto ... ..                                                               | 4   | 8                                   | 3                  | 2   | 192    |
| Cut-waters of abutments ... ..                                                   | 4   | $\frac{2}{3} \times 6$              | 5                  | 13½ | 1,080  |
| Caps over ditto ... ..                                                           | 4   | $\frac{2}{3} \times 6$              | $\frac{2½}{2}$     | 2   | 40     |
| Starlings ... ..                                                                 | 4   | $\frac{0 \cdot 7854}{2}$            | 5×5                | 7½  | 300    |
| 2 semi-arches ... ..                                                             | 1   | 31·7                                | 19                 | 2·5 | 1,506  |
| 2 semi-spandrills ... ..                                                         | 1   | (31×7½—113·2)                       |                    | 19  | 2,365  |
| Parapets over semi-arches ... ..                                                 | 4   | 15·5                                | 1·5                | 3·5 | 325    |
| Ditto starlings ... ..                                                           | 4   | $\frac{3 \cdot 1416}{2} \times 5$   | 1·5                | 3·5 | 165    |
| Ditto wing walls ... ..                                                          | 4   | $\frac{3 \cdot 1416}{3}$            | 27·25×1·5          | 3·5 | 599    |
| Ditto dwarf pillars ... ..                                                       | 4   | 3                                   | 3                  | 3·5 | 126    |
| Steps adjoining towing path ...                                                  | 4   | 10                                  | $\frac{11+2}{2}$   | 7   | 1,820  |
| And ... ..                                                                       | 4   | 12                                  | $\frac{11+2+2}{3}$ | 7   | 1,680  |
|                                                                                  |     |                                     |                    |     | 36,587 |
| <i>Deduct—</i>                                                                   |     |                                     |                    |     |        |
| Hollow under tow path ... ..                                                     | 2   | 19                                  | 3                  | 3   |        |
| Steps in back of abutments, in-<br>cluded in spandrills and wing<br>walls ... .. | 2   | 19                                  | 8                  | 2   | 950    |
| Total Masonry ... ..                                                             | ... | ...                                 | ...                | ... | 35,637 |



|                                                                       | No | L                 | B                 | D   | Total  |
|-----------------------------------------------------------------------|----|-------------------|-------------------|-----|--------|
| <i>Earth-work</i>                                                     |    |                   |                   |     |        |
| Approaches average section                                            | 2  | $\frac{450}{2}$   | $\frac{20+61}{2}$ | 115 | 2710.0 |
| Raising the ramps                                                     | 4  | $\frac{200}{2}$   | $\frac{20+61}{2}$ | 10  | 163000 |
| These will more than cover the excavation for extra width of channel. |    |                   |                   |     |        |
| Total Earth work                                                      |    |                   |                   |     | 4340.0 |
| <i>Masonry</i>                                                        |    |                   |                   |     |        |
| Over semi arches and abutments                                        | 2  | $\frac{14+5}{2}$  | 16                | 5   | 301    |
| Between wing walls                                                    | 2  | $\frac{46+16}{2}$ | 21                | 5   | 711    |
| Total Masonry                                                         |    |                   |                   |     | 1012   |
| <i>Cut Stone work</i>                                                 |    |                   |                   |     |        |
| Coping of parapets (total length)                                     |    | 219               | 20                | 05  | 219    |
| String course below parapets                                          |    | 219               | 10                | 05  | 110    |
| Ditto round the ends of abutments                                     | 2  | 31                | 10                | 05  | 3      |
| Facing of semi arches                                                 | 2  | 31.7              | 20                | 25  | 317    |
| Total Cut Stone work                                                  |    |                   |                   |     | 650    |

# ABSTRACT

Rs.

|        |                                                               |      |
|--------|---------------------------------------------------------------|------|
| 4340.0 | Cut stone work at Rs. 3 per 1000 cubic feet                   | 1320 |
| 31131  | Ditto masonry at Rs. 15 per 100 cubic feet                    | 5140 |
| 1506   | Ditto arch, at Rs. 25 per 100 cubic feet                      | 370  |
| 19     | Blocks, sinking at Rs. 60 each                                | 0.0  |
| 19     | Ditto curbs, at Rs. 25 each                                   | 475  |
| 650    | Cubic feet of cut stone work (extra charge) at Rs. 30 per 100 | 210  |
| 1012   | Ditto masonry at Rs. 6 per 100 cubic feet                     | 63   |
|        | Contingencies at 5 per cent.                                  | 22   |

Total cost of one span of 23 feet 14877

If under sunk foundations be not necessary the following reduction may be made —

|                                                   |     |
|---------------------------------------------------|-----|
| Half the masonry in blocks or say 4500 cubic feet | 0.0 |
| Sinking blocks                                    | 0.0 |
| Curbs for blocks                                  | 475 |
| Contingencies                                     | 100 |
| Total reduction                                   | 220 |

Leaving the cost of the one span of 23 feet 14657

## No. 13, BRIDGES.

## C. DESIGNS NOS. IV. AND VII.

## a. Abutments with two semi-arches.

|                                                                          | No. | L.                                  | D.                 | B.  | Total. |
|--------------------------------------------------------------------------|-----|-------------------------------------|--------------------|-----|--------|
| <i>Masonry.</i>                                                          |     |                                     |                    |     |        |
| Foundation blocks ... ..                                                 | 8   | (11×7— 8×4)                         |                    | 12  | 4,320  |
| Ditto ... ..                                                             | 7   | (13×7—10×4)                         |                    | 12  | 2,448  |
| Ditto ... ..                                                             | 4   | (15×7—12×4)                         |                    | 12  | 2,736  |
| Flooring over all as far as back of abutments ... ..                     | 2   | 24½                                 | 30                 | 2   | 2,940  |
| Ditto over blocks supporting steps                                       | 8   | 11                                  | 7                  | 2   | 1,232  |
| Abutments up to level of tow path ... ..                                 | 2   | 19                                  | 15                 | 7   | 3,990  |
| Ditto next portion above... ..                                           | 2   | 19                                  | 9                  | 4   | 1,368  |
| Ditto ditto ... ..                                                       | 2   | 19                                  | 7                  | 2½  | 621    |
| Ditto at back of spring of arch...                                       | 2   | 19                                  | $\frac{7+6}{2}$    | 1½  | 494    |
| Ditto at back of spandrill ..                                            | 2   | 19                                  | 3½                 | 4   | 570    |
| Wing walls, first ... ..                                                 | 4   | $\frac{3 \cdot 1416}{6} \times 28$  | 3                  | 18  | 3,169  |
| Ditto second ... ..                                                      | 4   | $\frac{3 \cdot 1416}{6} \times 27½$ | 2                  | 14  | 1,613  |
| Ditto square ends... ..                                                  | 4   | 3                                   | 3                  | 14  | 504    |
| Ditto over steps of abutments ...                                        | 4   | 2                                   | 3                  | 10  | 240    |
| Ditto ditto ... ..                                                       | 4   | 2                                   | 3                  | 6   | 144    |
| Ditto ditto ... ..                                                       | 4   | 8                                   | 3                  | 2   | 192    |
| Cut-waters of abutments ...                                              | 4   | $\frac{2}{3} \times 6$              | 5                  | 13½ | 1,080  |
| Caps over ditto ... ..                                                   | 4   | $\frac{2}{3} \times 6$              | $\frac{2½}{2}$     | 2   | 40     |
| Starlings ... ..                                                         | 4   | $\frac{0 \cdot 7854}{2}$            | 5×5                | 7½  | 300    |
| 2 semi-arches ... ..                                                     | 1   | 31·7                                | 19                 | 2·5 | 1,506  |
| 2 semi-spandrills ... ..                                                 | 1   | (31×7½—113·2)                       | 1·5                | 19  | 2,365  |
| Parapets over semi-arches ...                                            | 4   | 15·5                                | 1·5                | 3·5 | 325    |
| Ditto starlings ... ..                                                   | 4   | $\frac{3 \cdot 1416}{2} \times 5$   | 1·5                | 3·5 | 165    |
| Ditto wing walls ... ..                                                  | 4   | $\frac{3 \cdot 1416}{3}$            | 27·25×1·5          | 3·5 | 599    |
| Ditto dwarf pillars ... ..                                               | 4   | 3                                   | 3                  | 3·5 | 126    |
| Steps adjoining towing path ...                                          | 4   | 10                                  | $\frac{11+2}{2}$   | 7   | 1,820  |
| And ... ..                                                               | 4   | 12                                  | $\frac{11+2+2}{3}$ | 7   | 1,680  |
|                                                                          |     |                                     |                    |     | 36,587 |
| <i>Deduct—</i>                                                           |     |                                     |                    |     |        |
| Hollow under tow path ... ..                                             | 2   | 19                                  | 3                  | 3   |        |
| Steps in back of abutments, included in spandrills and wing walls ... .. | 2   | 19                                  | 8                  | 2   | 950    |
| Total Masonry ... ..                                                     | ... | ...                                 | ...                | ... | 35,637 |

|                                                                       | No. | L.                | B.                | D.   | Total.  |
|-----------------------------------------------------------------------|-----|-------------------|-------------------|------|---------|
| <i>Earth-work.</i>                                                    |     |                   |                   |      |         |
| Approaches, average section ...                                       | 2   | $\frac{450}{2}$   | $\frac{20+61}{2}$ | 11.5 | 274,050 |
| Raising side ramps ... ..                                             | 4   | $\frac{200}{2}$   | $\frac{20+61}{2}$ | 10   | 168,000 |
| These will more than cover the excavation for extra width of channel. |     |                   |                   |      |         |
| Total Earth-work ...                                                  | ... | ...               | ...               | ...  | 442,050 |
| <i>Metalling.</i>                                                     |     |                   |                   |      |         |
| Over semi-arches and abutments                                        | 2   | 14+5              | 10                | .5   | 301     |
| Between wing walls ... ..                                             | 2   | $\frac{46+16}{2}$ | 21                | .5   | 711     |
| Total Metalling... ..                                                 | ... | ...               | ...               | ...  | 1,019   |
| <i>Cut Stone-work.</i>                                                |     |                   |                   |      |         |
| .....                                                                 | ..  | 219               | 2.0               | 0.5  | 219     |
| .....                                                                 | ..  | 219               | 1.0               | 0.5  | 110     |
| .....                                                                 | 2   | 31                | 1.0               | 0.5  | 37      |
| .....                                                                 | 2   | 31.7              | 2.0               | 2.5  | 317     |
| Total Cut Stone-work ...                                              | ..  | ...               | ...               | ...  | 680     |

## ABSTRACT.

|                                                                         | Rs.       |
|-------------------------------------------------------------------------|-----------|
| 4,42,050 Cubic feet of earth-work, at Rs. 3 per 1,000 cubic feet ... .. | 1,326     |
| 31,131 Ditto masonry, at Rs. 15 per 100 cubic feet ... ..               | 5,120     |
| 1,500 Ditto arch, at Rs. 25 per 100 cubic feet ... ..                   | 376       |
| 19 Blocks, sinking, at Rs. 60 each ... ..                               | 950       |
| 19 Ditto, curbs, at Rs. 25 each ... ..                                  | 475       |
| 680 Cubic feet of cut stone-work (extra charge), at Rs. 30 per 100      | 210       |
| 1,019 Ditto metalling, at Rs. 6 per 100 cubic feet ... ..               | 63        |
| Contingencies at 5 per cent. ... ..                                     | 227       |
| Total cost of one span of 23 feet ... ..                                | Rs. 8,779 |

If under-sunk foundations be not necessary, the following reductions may be made:—

|                                                            | Rs.       |
|------------------------------------------------------------|-----------|
| Half the masonry in blocks, or say 4,500 cubic feet ... .. | 675       |
| Sinking blocks ... ..                                      | 550       |
| Curbs for blocks ... ..                                    | 475       |
| Contingencies ... ..                                       | 105       |
| Total reduction ... ..                                     | 2,205     |
| Leaving the cost of the one span of 23 feet ... ..         | Rs. 6,574 |

No. 13, BRIDGES.

.C. Designs Nos. IV. and VII.

b. Pier with two semi-arches.

|                                  | No. | L.                     | B.              | D.    | Total. |
|----------------------------------|-----|------------------------|-----------------|-------|--------|
| <i>Masonry.</i>                  |     |                        |                 |       |        |
| Foundation blocks ... ..         | 3   | (13 × 7) — (10 × 4)    |                 | 12    | 1,836  |
| Ditto ... ..                     | 1   | (15 × 7) — (12 × 4)    |                 | 12    | 684    |
| Flooring over all ... ..         | 1   | 33                     | 30              | 2     | 1,980  |
| Pier body ... ..                 | 1   | 19                     | 5               | 13·33 | 1,254  |
| Cut-waters ... ..                | 2   | $\frac{2}{3} \times 6$ | 5               | 13·33 | 533    |
| Caps to ditto ... ..             | 2   | $\frac{2}{3} \times 5$ | 4               | 2     | 53     |
| Portion between skew backs ...   | 1   | 19                     | $\frac{2+5}{2}$ | 2·33  | 221    |
| Starlings ... ..                 | 2   | $\frac{7,854}{2}$      | 5 × 5           | 7·66  | 150    |
| 2 semi-arches (as in part a) ... | ... | ...                    | ...             | ...   | 1,508  |
| 2 semi-spandrills ditto ... ..   | ... | ...                    | ...             | ...   | 2,365  |
| Space between spandrills ... ..  | 1   | 19                     | 2               | 6·33  | 241    |
| Parapets over arch ... ..        | 2   | 28                     | 1·5             | 3·5   | 147    |
| Ditto starlings ... ..           | 2   | $\frac{3,1416}{2}$     | 5 × 1·5         | 3·5   | 82     |
| Total Masonry ... ..             | ... | ...                    | ...             | ...   | 12,154 |
| <i>Cut Stone-work.</i>           |     |                        |                 |       |        |
| Coping of parapets ... ..        | ... | 72                     | 2·0             | 0·5   | 72     |
| String course of ditto ... ..    | ... | 72                     | 1·0             | 0·5   | 36     |
| Ditto of head of pier ... ..     | ... | 53                     | 1·0             | 0·5   | 27     |
| Facing of arch ... ..            | 2   | 31·7                   | 2·0             | 2·5   | 317    |
| Total Cut stone-work ... ..      | ... | ...                    | ...             | ...   | 452    |
| <i>Metalling.</i>                |     |                        |                 |       |        |
| Roadway ... ..                   | 1   | 33                     | 16              | 0·5   | 264    |

ABSTRACT.

|                                                                   | Rs.   |
|-------------------------------------------------------------------|-------|
| 10,646 Cubic feet of masonry, at Rs. 15 per 100 cubic feet ... .. | 1,597 |
| 1,508 Ditto arching, at Rs. 25 per 100 cubic feet ... ..          | 377   |
| 4 Blocks, curb frames, large, at Rs. 30 each ... ..               | 120   |
| 4 Sinking ditto, at Rs. 60 each ... ..                            | 240   |
| 264 Cubic feet of metalling, at Rs. 6 per 100 cubic feet ... ..   | 16    |
| Contingencies at 5 per cent. ... ..                               | 117   |
| Total ... Rs.                                                     | 2,467 |

If under sunk foundations be not necessary, the following reductions may be made:—

|                                                                   | Ra. |
|-------------------------------------------------------------------|-----|
| Half the masonry in blocks, or say 1,250 cubic feet, at Rs. 15 .. | 187 |
| Linking blocks ... ..                                             | 240 |
| Curb frames for ditto ... ..                                      | 120 |
| Contingencies ... ..                                              | 27  |
| Total ..                                                          | 574 |

Leaving the cost of one span of 23 feet ... Ra. 1,593

### GENERAL ABSTRACT.

|                                                        | With under<br>sunk found-<br>ations. | Without un-<br>der sunk<br>foundations |
|--------------------------------------------------------|--------------------------------------|----------------------------------------|
| Bridge of one span as per Abstract a— ... ..           | 8,779                                | 6,574                                  |
| Ad 1 per pier and semi arches as per Abstract b ... .. | 2,167                                | 1,893                                  |
| Cost of bridge with 2 spans of 23 feet ... ..          | 11,216                               | 8,167                                  |

The cost of the bridge of one arch will be taken in the general estimate at Rs. 7,000, and the two arched bridge at Rs. 10,000

## No. 13, BRIDGES.

## D. Design No. V.

|                                   | No. | L.                              | B.                 | D.   | Total. |
|-----------------------------------|-----|---------------------------------|--------------------|------|--------|
| <i>Masonry.</i>                   |     |                                 |                    |      |        |
| Foundation blocks ... ..          | 16  | (12×7—9×4)                      |                    | 12   | 9,216  |
| Ditto " ... ..                    | 4   | (14×7—11×4)                     |                    | 12   | 2,592  |
| Flooring over all ... ..          | 1   | 32                              | 26                 | 2    | 1,664  |
| Ditto over blocks under steps...  | 8   | 12                              | 7                  | 2    | 1,344  |
| Abutment up to top of tow-path... | 2   | 19                              | 16                 | 5    | 3,040  |
| Ditto above ditto ... ..          | 2   | 19                              | 10                 | 3·5  | 1,830  |
| Ditto behind skew backs ...       | 2   | 19                              | $\frac{6+8}{2}$    | 2    | 753    |
| Ditto ditto spandril ... ..       | 2   | 19                              | 6                  | 1·66 | 380    |
| Ditto ditto ... ..                | 2   | 19                              | 4                  | 5    | 760    |
| Wing walls ... ..                 | 4   | $\frac{3·1416}{6} \times 30·5$  | 3                  | 19   | 3,641  |
| Ditto ... ..                      | 4   | $\frac{3·1416}{6} \times 30$    | 2                  | 16   | 2,044  |
| Ditto over steps of abutments...  | 4   | 2                               | 3                  | 11   | 264    |
| Ditto ditto ... ..                | 4   | 2                               | 3                  | 7    | 168    |
| Ditto ditto ... ..                | 4   | 12                              | 3                  | 2    | 288    |
| Ditto ditto ends ... ..           | 4   | 3                               | 3                  | 16   | 576    |
| Starlings of abutments ... ..     | 4   | $\frac{·7854}{2}$               | 7×7                | 22   | 1,693  |
| Arch ... ..                       | 1   | 49·5                            | 19                 | 3·5  | 3,314  |
| Spandrills ... ..                 | 1   | 48·2×11·33—264                  |                    | 19   | 5,360  |
| Parapets over arch ... ..         | 2   | 44                              | 1·5                | 3·5  | 462    |
| Ditto starlings ... ..            | 4   | $\frac{3·1416}{2} \times 7$     | 1·5                | 3·5  | 230    |
| Ditto wing walls ... ..           | 4   | $\frac{3·1416}{3} \times 29·75$ | 1·5                | 3·5  | 654    |
| Ditto corners ... ..              | 4   | 3                               | 3                  | 3·5  | 126    |
| Steps ... ..                      | 4   | 10                              | $\frac{10+2}{2}$   | 4    | 960    |
| Ditto ... ..                      | 4   | 15                              | $\frac{10+2+2}{3}$ | 4    | 1,680  |
|                                   | ... | ...                             | ...                | ...  | 42,539 |
| Deduct—Hollow of towing path...   | 2   | 19                              | 4                  | 2    | 304    |
| Step over abutments ... ..        | 2   | 19                              | 8                  | 2    | 608    |
|                                   | ... | ...                             | ...                | ...  | 912    |
| Total Masonry ... ..              | ... | ...                             | ...                | ...  | 41,627 |
| <i>Metalling.</i>                 |     |                                 |                    |      |        |
| Over arch and abutments...        | 1   | 58                              | 16                 | 0·5  | 464    |
| Between wing walls ... ..         | 2   | $\frac{46+16}{2}$               | 28                 | 0·5  | 864    |
| Total Metalling ... ..            | ... | ...                             | ...                | ...  | 1,328  |

|                            | No. | L.              | B.                | D.  | Total   |
|----------------------------|-----|-----------------|-------------------|-----|---------|
| <i>Earth-work.</i>         |     |                 |                   |     |         |
| In approaches ... ..       | 4   | $\frac{210}{2}$ | $\frac{70+20}{2}$ | 12  | 259,200 |
| Ditto side ... ..          | 2   | $\frac{450}{2}$ | $\frac{70+20}{2}$ | 16  | 321,000 |
| Total Earth-work ...       | ... | ...             | ...               | ... | 580,200 |
| <i>Cut Stone-work.</i>     |     |                 |                   |     |         |
| Coping of parapets ... ..  | ... | 268             | 20                | 05  | 268     |
| String course of ditto ... | ... | 268             | 10                | 05  | 131     |
| Heads of abutments ...     | 2   | 41              | 10                | 05  | 41      |
| Facing of arch ... ..      | 2   | 495             | 20                | 35  | 630     |
| Total ... ..               | ... | ...             | ...               | ... | 1,136   |

## ABSTRACT.

|                                                               | Ra.   |
|---------------------------------------------------------------|-------|
| 580,200 Cubic feet of earth-work, at Ra. 2.8 per 1,000 ... .. | 1,658 |
| 39,313 Ditto masonry, at Ra. 15 per 100 ... ..                | 5,717 |
| 3,314 Ditto arch, at Ra. 25 per 100 ... ..                    | 828   |
| 20 Blocks, curb frames, at Ra. 25 each ... ..                 | 500   |
| 20 Ditto, sinking, at Ra. 50 each ... ..                      | 1,000 |
| 1,329 Cubic feet of metalling, at Ra. 6 per 100 ... ..        | 80    |
| 1,136 Ditto cut stone-work, at Ra. 30 per 100 ... ..          | 311   |
| Contingencies at 5 per cent. ... ..                           | 496   |

Total for one span of 41 feet ... Ra. 10,452

If block-sinking be not necessary, the following reductions may be made. Ra.

|                                                                             |       |
|-----------------------------------------------------------------------------|-------|
| Two-thirds of masonry in blocks, or 8,000 cubic feet, at Ra. 15 per 100 ... | 1,200 |
| Block sinking ... ..                                                        | 1,000 |
| Curb blocks ... ..                                                          | 500   |
| Contingencies at 5 per cent. ... ..                                         | 135   |

Total ... Ra. 2,835

Leaving the cost of one span of 41 feet... Ra. 7,617

The sum of Ra. 9,000 will be used in the General Estimate.

## No. 13, BRIDGES.

## E. Design No. VIII.

|                                                            | No. | L.                                          | B.                         | D.   | Total. |
|------------------------------------------------------------|-----|---------------------------------------------|----------------------------|------|--------|
| <i>Masonry.</i>                                            |     |                                             |                            |      |        |
| Abutments from bottom of foundation to top of tow-path ... | 2   | 19                                          | 9                          | 9.5  | 3,249  |
| Curtain walls ... ..                                       | 2   | 16                                          | 2                          | 6    | 384    |
| Curved walls of tow-paths ...                              | 4   | $\frac{3 \cdot 1416}{2} \times 7$           | 2                          | 6    | 528    |
| Flooring ... ..                                            | 1   | 20                                          | 16                         | 1.5  | 480    |
| Abutments above tow-path ...                               | 2   | 19                                          | 6                          | 2.5  | 570    |
| Ditto behind skew backs ...                                | 2   | 19                                          | $\frac{4 + 2 \cdot 75}{2}$ | 3    | 343    |
| Ditto behind spandril ...                                  | 2   | 19                                          | .75                        | 3.5  | 100    |
| Starlings ... ..                                           | 4   | $\frac{0 \cdot 7854}{2}$                    | 5 x 5                      | 19   | 746    |
| Wing walls ... ..                                          | 4   | $\frac{3 \cdot 1416}{6} \times 16 \cdot 75$ | 2.5                        | 12.5 | 1,076  |
| Ditto ... ..                                               | 4   | $\frac{3 \cdot 1416}{6} \times 16 \cdot 5$  | 2                          | 10.5 | 722    |
| Ditto portion over steps of abutment ... ..                | 4   | 2                                           | 2.5                        | 6.5  | 130    |
| Ditto ditto ditto ... ..                                   | 4   | 2                                           | 2.5                        | 3.5  | 70     |
| End pillars ... ..                                         | 4   | 2.5                                         | 2.5                        | 10.5 | 262    |
| Arch ... ..                                                | 1   | 25                                          | 19                         | 2    | 950    |
| Spandrills ... ..                                          | 1   | $24 \cdot 4 \times 4 \cdot 1$               | 67.5                       | 19   | 608    |
| Parapets over arch ... ..                                  | 2   | 22                                          | 1.5                        | 3.5  | 231    |
| Ditto over starlings ... ..                                | 4   | $\frac{3 \cdot 1416}{2} \times 5$           | 1.5                        | 3.5  | 164    |
| Ditto wing walls ... ..                                    | 4   | $\frac{3 \cdot 1416}{3} \times 16 \cdot 25$ | 1.5                        | 3.5  | 353    |
| Dwarf pillars at ends ... ..                               | 4   | 2.5                                         | 2.5                        | 3.5  | 87     |
| Deduct ... ..                                              | ... | ...                                         | ...                        | ...  | 11,053 |
| Hollow under tow-paths ... ..                              | 2   | 19                                          | 1.5                        | 2    | 114    |
| Total Masonry ... ..                                       | ... | ...                                         | ...                        | ...  | 10,939 |
| <i>Cut Stone-work.</i>                                     |     |                                             |                            |      |        |
| Coping of parapets ... ..                                  | ... | 153                                         | 2.0                        | 0.5  | 153    |
| String course of ditto ... ..                              | ... | 153                                         | 1.0                        | 0.5  | 76     |
| Heads of abutments ... ..                                  | 2   | 34                                          | 1.0                        | 0.5  | 34     |
| Facing of arch ... ..                                      | 2   | 25                                          | 2.0                        | 2.0  | 200    |
| Total Cut Stone-work ... ..                                | ... | ...                                         | ...                        | ...  | 463    |
| <i>Metalling.</i>                                          |     |                                             |                            |      |        |
| Over arch ... ..                                           | 1   | 22                                          | 16                         | 0.5  | 176    |
| Between wing walls ... ..                                  | 1   | 20                                          | $\frac{32 + 16}{2}$        | 0.5  | 240    |
| Total Metalling... ..                                      | ... | ...                                         | ...                        | ...  | 416    |



|                        | No. | L               | B                 | D  | Total.   |
|------------------------|-----|-----------------|-------------------|----|----------|
| <i>Earth work</i>      |     |                 |                   |    |          |
| In approaches . . . .  | 2   | $\frac{295}{2}$ | $\frac{20+49}{2}$ | 95 | 92,055   |
| And side ramps . . . . | 4   | $\frac{170}{2}$ | $\frac{20+49}{2}$ | 65 | 57,160   |
| Total Earth work       | ... |                 |                   |    | 1,49,515 |

## ABSTRACT.

|                                                                 |                                                |     |     |               | Rs.     |
|-----------------------------------------------------------------|------------------------------------------------|-----|-----|---------------|---------|
| 1,49,515                                                        | Cubic feet of earth work, at Rs. 2-8 per 1,000 | ... | -   |               | 374     |
| 9,989                                                           | Ditto masonry, at Rs. 15 per 100               | ... | ... |               | 1,498   |
| 950                                                             | Ditto arch, at Rs. 20 per 100                  | ..  | .   | .             | 190     |
| 416                                                             | Ditto metalling, at Rs. 6 per 100              | ... | ... |               | 25      |
| 463                                                             | Ditto cut stone work, at Rs. 30 per 100        |     |     |               | 139     |
|                                                                 | Contingencies at 5 per cent                    | ... |     | ...           | 111     |
|                                                                 |                                                |     |     | Total ... Rs. | 2,337   |
| Amount used in general estimate for bridge of 1 span of 22 feet |                                                |     |     |               | " 2,300 |

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## No. 13, BRIDGES.

## F. Design No. IX.

|                                                           | No. | L.                                    | B.                | D.   | Total.  |
|-----------------------------------------------------------|-----|---------------------------------------|-------------------|------|---------|
| <i>Masonry.</i>                                           |     |                                       |                   |      |         |
| Abutment from bottom of foundation to top of tow-path ... | 2   | 19                                    | 7                 | 9    | 2,394   |
| Curtain walls ... ..                                      | 2   | 12                                    | 2                 | 6    | 288     |
| Curved wings for tow-paths ...                            | 4   | $\frac{3 \cdot 1416}{2} \times 4$     | 2                 | 9    | 452     |
| Flooring ... ..                                           | 1   | 12                                    | 19.5              | 2    | 468     |
| Abutments above tow-path ...                              | 2   | 19                                    | 5                 | 3.33 | 633     |
| Ditto behind skew back ...                                | 2   | 19                                    | $\frac{5+2}{2}$   | 1.66 | 221     |
| Ditto behind spandrills ...                               | 2   | 19                                    | 2                 | 2    | 152     |
| Starlings (to top of parapet) ...                         | 4   | $\frac{0.7854}{2} \times 3$           | 3                 | 21.5 | 304     |
| Wing walls ... ..                                         | 4   | $\frac{3 \cdot 1416}{3} \times 14$    | 2                 | 10   | 1,172   |
| Ditto over abutment steps...                              | 4   | 2                                     | 2                 | 3.5  | 56      |
| Ditto ditto ditto ...                                     | 4   | 2                                     | 2                 | 1.5  | 24      |
| End pillars... ..                                         | 4   | 2.5                                   | 2.5               | 10   | 250     |
| Arch ... ..                                               | 1   | 18                                    | 19                | 1.5  | 513     |
| Spandrills ... ..                                         | 1   | $(18 \times 3.5 - 36)$                |                   | 19   | 513     |
| Parapet over arch and abutment...                         | 2   | 22                                    | 1.5               | 3.5  | 231     |
| Ditto over wing walls ...                                 | 4   | $\frac{3 \cdot 1416}{3} \times 13.25$ | 1.5               | 3.5  | 291     |
| Dwarf pillars at ends ... ..                              | 4   | 2                                     | 2                 | 3.5  | 56      |
| Total Masonry ...                                         | ... | ...                                   | ...               | ...  | 8,018   |
| <i>Cut Stone-work.</i>                                    |     |                                       |                   |      |         |
| Coping of parapet ... ..                                  | ... | 117                                   | 2.0               | 0.5  | 117     |
| String course of ditto ... ..                             | ... | 117                                   | 1.0               | 0.5  | 58      |
| Heads of abutments ... ..                                 | 2   | 28                                    | 1.0               | 0.5  | 28      |
| Facing of arch ... ..                                     | 2   | 18                                    | 2.0               | 1.5  | 108     |
| Total ...                                                 | ... | ...                                   | ...               | ...  | 311     |
| <i>Metalling.</i>                                         |     |                                       |                   |      |         |
| Over arch ... ..                                          | 1   | 16                                    | 16                | 0.5  | 128     |
| Between wing walls ... ..                                 | 1   | 17                                    | $\frac{32+16}{2}$ | 0.5  | 204     |
| Total ...                                                 | ... | ...                                   | ...               | ...  | 332     |
| <i>Earth-work.</i>                                        |     |                                       |                   |      |         |
| In approaches ... ..                                      | 2   | $\frac{255}{2}$                       | $\frac{20+44}{2}$ | 8.5  | 69,360  |
| Ditto in side ramps ... ..                                | 4   | $\frac{110}{2}$                       | $\frac{20+44}{2}$ | 5.5  | 38,720  |
| Total ...                                                 | ... | ...                                   | ...               | ...  | 108,080 |

## ABSTRACT.

|         |                                          |    |     |     | Rs.   |
|---------|------------------------------------------|----|-----|-----|-------|
| 7,503   | Cubic feet of masonry, at Rs. 15 per 100 | .. | ... | ... | 1,125 |
| 513     | Ditto arch, at Rs. 20 per 100            | .. | .   | ... | 102   |
| 311     | Ditto cut stone work, at Rs. 300 per 100 | .  | ... | .   | 93    |
| 108,080 | Ditto earth work, at Rs. 2-8 per 1,000   | .. | ... | ... | 272   |
| 332     | Ditto metalling, at Rs. 6 per 100        | .  | ... | ... | 20    |
|         | Contingencies at 5 per cent              | .  | ... | ... | 80    |

Total ..Rs. 1,602

Amount used in general estimate for bridge of 1 span of 16 feet . " 1,700

## G. Design No. X.

|                                   | No. | L.                             | B.  | D.              | Total. |
|-----------------------------------|-----|--------------------------------|-----|-----------------|--------|
| <i>Masonry.</i>                   |     |                                |     |                 |        |
| Abutments up to top of tow path.. | 2   | 19                             | 63  | 8               | 1,276  |
| Curtain walls .. ..               | 2   | 7                              | 15  | 6               | 126    |
| Curved ends to tow paths ..       | 4   | $\frac{31416}{2} \times 3.75$  | 2   | 8               | 376    |
| Flooring ... ..                   | 1   | 7                              | 19  | 15              | 199    |
| Abutments above tow path ...      | 2   | 19                             | 6   | 35              | 665    |
| Ditto behind skew backs . .       | 2   | 19                             | 75  | $\frac{123}{2}$ | 36     |
| Abutments to top ... ..           | 2   | 19                             | 325 | 4               | 491    |
| Starlings to top of parapets .    | 4   | $\frac{67851}{2} \times 3$     | 3   | 185             | 261    |
| Wing walls ... ..                 | 4   | $\frac{31416}{3} \times 13$    | 2   | 9               | 980    |
| Ditto over abutment steps .       | 4   | 19                             | 1   | 4               | 301    |
| Ditto end pillar .. ..            | 4   | 25                             | 25  | 11              | 275    |
| Arch ... ..                       | 1   | 117                            | 19  | 15              | 333    |
| Span drill ... ..                 | 1   | $114 \times 2 = 157$           |     | 19              | 157    |
| Parapets over arch and abutment.  | 2   | 16                             | 15  | 35              | 17     |
| Ditto over wing walls . .         | 4   | $\frac{31416}{3} \times 12.75$ | 15  | 35              | 27     |
| Dwarf pillars at corners . .      | 4   | 2                              | 2   | 35              | 27     |
| Total Masonry ..                  |     | .                              | .   |                 | 6,071  |

|                               | No. | L.              | B.                | D.  | Total. |
|-------------------------------|-----|-----------------|-------------------|-----|--------|
| <i>Cut Stone-work.</i>        |     |                 |                   |     |        |
| Coping of parapets ... ..     | ... | 100             | 2.0               | 0.5 | 100    |
| String course of ditto ... .. | ... | 100             | 1.0               | 0.5 | 50     |
| Heads of abutments ... ..     | 2   | 26.5            | 1.0               | 0.5 | 26     |
| Facing of arch ... ..         | 2   | 15.75           | 2.0               | 1.5 | 95     |
| Total Cut Stone-work ... ..   | ... | ...             | ...               | ... | 271    |
| <i>Metalling.</i>             |     |                 |                   |     |        |
| Over arch... ..               | 1   | 10              | 16                | 0.5 | 80     |
| Between wing walls ... ..     | 2   | 15              | $\frac{32+16}{2}$ | 0.5 | 360    |
| Total Metalling ... ..        | ... | ...             | ...               | ... | 440    |
| <i>Earth-work.</i>            |     |                 |                   |     |        |
| In approaches ... ..          | 2   | $\frac{225}{2}$ | $\frac{40+20}{2}$ | 7.5 | 50,625 |
| Ditto side ramps ... ..       | 4   | $\frac{100}{2}$ | $\frac{40+20}{2}$ | 5   | 30,000 |
| Total Earth-work ... ..       | ... | ...             | ...               | ... | 80,625 |

## ABSTRACT.

|                                                              | Rs.   |
|--------------------------------------------------------------|-------|
| 80,625 Cubic feet of earth-work, at Rs. 2.8 per 1,000 ... .. | 201   |
| 6,346 Ditto masonry, at Rs. 15 per 100 ... ..                | 952   |
| 333 Ditto arch, at Rs. 20 per 100 ... ..                     | 67    |
| 271 Ditto cut stone-work, at Rs. 30 per 100 ... ..           | 81    |
| 440 Ditto metalling, at Rs. 6 per 100 ... ..                 | 26    |
| Contingencies at 5 per cent. ... ..                          | 66    |
| Total ...Rs.                                                 | 1,393 |

Amount used in general estimate for bridge of one span of 12 feet ... Rs. 1,400

*II. Culverts in approaches, 4 feet water-way.*

|                                | No  | L. | B.   | D     | Total. |
|--------------------------------|-----|----|------|-------|--------|
| <i>Masonry</i>                 |     |    |      |       |        |
| Body of culvert taken solid .. | 1   | 65 | 8    | 4     | 2 050  |
| Arch taken solid ..            | 1   | 65 | 78×8 | 8×0.5 | 1,622  |
|                                |     |    |      |       | 3,702  |
| Deduct—Hollow of body ..       | 1   | 65 | 4    | 2     | 520    |
| Half ditto of arch ..          | 0.5 | 65 | 78×4 | 4×0.5 | 203    |
|                                |     |    |      |       | 723    |
| Total Masonry                  |     | .. | ..   | ...   | 2,979  |

## ABSTRACT.

|       |                                             |     |     |     |
|-------|---------------------------------------------|-----|-----|-----|
| 2,979 | Cubic feet of masonry, at Rs. 15 per 100 .. | ... | Rs. | 447 |
|       | Contingencies at 5 per cent.                | ..  | ..  | 22  |
|       | Total                                       | Rs. | Rs. | 469 |
|       | Amount taken in general estimate            | Rs. | Rs. | 470 |

*K. Culverts in approaches, 3 feet water-way.*

|                             | No. | L. | B.     | D     | Total |
|-----------------------------|-----|----|--------|-------|-------|
| <i>Masonry</i>              |     |    |        |       |       |
| Body of culvert taken solid | 1   | 45 | 6      | 3     | 810   |
| Arch taken solid            | 1   | 45 | 0.75×6 | 6×0.5 | 632   |
|                             |     |    |        |       | 1,442 |
| Deduct—Hollow of body ..    | 1   | 45 | 3      | 1.5   | 202   |
| Half ditto of arch ..       | 0.5 | 45 | 7.5×3  | 3×0.5 | 79    |
|                             |     |    |        |       | 281   |
| Total Masonry               | ..  | .. |        |       | 1,161 |

## ABSTRACT.

|       |                                             |     |     |     |
|-------|---------------------------------------------|-----|-----|-----|
| 1,161 | Cubic feet of masonry, at Rs. 15 per 100 .. | ..  | Rs. | 174 |
|       | Contingencies at 5 per cent.                | ..  | ..  | 9   |
|       | Total ..                                    | Rs. | Rs. | 183 |
|       | Amount taken in general estimate            | Rs. | Rs. | 183 |

## No. 14, BRANCH HEADS.

## A. Channels, Classes III. to VII.

*Work required in addition to the Bridges.*

|                                     | No. | L.                         | B.                       | D.                   | Total.          |
|-------------------------------------|-----|----------------------------|--------------------------|----------------------|-----------------|
| <i>Masonry.</i>                     |     |                            |                          |                      |                 |
| Redan shaped steps sides... ..      | 2   | 54                         | $\frac{14+2}{2}$         | 7                    | 6,048           |
| Ditto angle solid ... ..            | 1   | $\frac{7854 \times 3}{8}$  | $\frac{24 \times 24}{3}$ | 7                    | 33              |
| Blocks under ditto ... ..           | 8   | $13 \times 7 - 0 \times 4$ |                          | 10                   | 4,080           |
| Wells at angle ... ..               | 3   | $7854 \times (8^2 - 5^2)$  |                          | 10                   | 919             |
|                                     |     |                            |                          |                      | 11,080          |
| Deduct hollow under arches ...      | 2   | 54                         | 3.5                      | $\frac{2+4}{2}$      | ...             |
|                                     |     |                            |                          |                      | 1,134           |
|                                     |     |                            |                          |                      | 9,946           |
| Stairs ... ..                       | 1   | 30                         | 9                        | 19 + 4.5             | 3,172           |
| Parapets ... ..                     | 2   | 30                         | 1.5                      | 3                    | 270             |
|                                     |     |                            |                          |                      | 13,388          |
| <i>Deduct—</i>                      |     |                            |                          |                      |                 |
| First ... ..                        | 1   | 12                         | 4                        | 9                    | 432             |
| Second ... ..                       | 1   | 9                          | $\frac{4.5}{2}$          | 9                    | 182             |
| Third ... ..                        | 1   | 4.5                        | 9                        | 4                    | 162             |
| Fourth ... ..                       | 1   | 6.5                        | 9                        | $\frac{10.5 + 7}{2}$ | 497             |
| Total Masonry, excluding flooring.. | ... | ...                        | ...                      | ...                  | 1,271<br>12,117 |
| <i>Wood-work.</i>                   |     |                            |                          |                      |                 |
| Class III. Beams ... ..             | 8   | 30                         | 1                        | 0.66                 | 160             |
| Boards 4 x 7 ... ..                 | 108 | 9                          | 1                        | $\frac{1}{8}$        | 121             |
|                                     |     |                            |                          |                      | 281             |
| Class IV. Beams ... ..              | 8   | 23                         | 1                        | 0.5                  | 92              |
| Boards 4 x 21 ... ..                | 84  | 7.5                        | 1                        | $\frac{5}{48}$       | 65              |
|                                     |     |                            |                          |                      | 157             |
| Class V. Beams two arches ...       | 4   | 35                         | 1                        | 0.5                  | 70              |
| Boards 2 x 32 ... ..                | 64  | 6.5                        | 1                        | $\frac{1}{12}$       | 35              |
|                                     |     |                            |                          |                      | 105             |

|                       | No. | L.  | R. | D              | Total. |
|-----------------------|-----|-----|----|----------------|--------|
| Class VI. Beams .. .. | 4   | 28  | 1  | $\frac{3}{12}$ | 47     |
| Boards 2x25 .. ..     | 60  | 6   | 1  | $\frac{1}{12}$ | 25     |
|                       |     |     |    |                | 72     |
| Class VII Beams .. .. | 4   | 225 | 1  | $\frac{1}{12}$ | 37     |
| Boards .. ..          | 40  | 5   | 1  | $\frac{1}{12}$ | 12     |
|                       |     |     |    |                | 49     |

|                 | FLOORING |    |    |    |        | DRY STONE WORK. |    |    |    |        |
|-----------------|----------|----|----|----|--------|-----------------|----|----|----|--------|
|                 | No.      | L. | B. | B. | Total. | No.             | L. | B. | D  | Total. |
| Class III .. .. | 2        | 53 | 25 | 2  | 5300   | 2               | 69 | 15 | 3  | 8120   |
| IV .. ..        | 2        | 40 | 22 | 2  | 3520   | 2               | 62 | 15 | 3  | 4650   |
| V .. ..         | 2        | 26 | 22 | 2  | 2268   | 2               | 30 | 15 | 3  | 3210   |
| VI .. ..        | 2        | 19 | 22 | 2  | 1672   | 2               | 27 | 15 | 25 | 2025   |
| VII .. ..       | 2        | 14 | 22 | 2  | 1,232  | 2               | 20 | 15 | 2  | 1,200  |

## ABSTRACT

|             |                                                        | Ra.  |
|-------------|--------------------------------------------------------|------|
| III. 12 117 | Cubic feet of masonry, at Pa. 15 per 100 cubic feet .. | 1817 |
| 5,300       | Ditto flooring at Ra. 15 per 100 cubic feet ..         | 795  |
| 0,120       | Ditto dry stone-work, at Ra. per 100 cubic feet ..     | 490  |
| 281         | Ditto wood work, at Pa. 3 per foot ..                  | 843  |
|             | Blocks and Tackling .. ..                              | 50   |
|             | Contingencies at 5 per cent .. ..                      | 100  |

Total Ra. 4191

|            |                                                        |       |
|------------|--------------------------------------------------------|-------|
| IV. 12 117 | Cubic feet of masonry, at Ra. 16 per 100 cubic feet .. | 1,517 |
| 3,520      | Ditto flooring at Ra. 15 per 100 cubic feet ..         | 528   |
| 4,650      | Ditto dry stone-work at Pa. 8 per 100 cubic feet ..    | 374   |
| 157        | Ditto wood work, at Pa. 3 per foot ..                  | 471   |
|            | Blocks and Tackling .. ..                              | 50    |
|            | Contingencies at 5 per cent .. ..                      | 130   |

Total . Pa. 3,270

|          |                                                         |       |
|----------|---------------------------------------------------------|-------|
| V 12,117 | Cubic feet of masonry, at Pa. 15 per 100 cubic feet ... | 1,517 |
| 2,268    | Ditto flooring, at Ra. 15 per 100 cubic feet ..         | 343   |
| 3,210    | Ditto dry stone work, at Ra. 8 per 100 cubic feet ..    | 259   |
| 105      | Ditto wood work, at Ra. 3 per foot...                   | 315   |
|          | Blocks and Tackling .. ..                               | 50    |
|          | Contingencies at 5 per cent .. ..                       | 131   |

Total Pa. 2,115

|               |                                                     |     |     |       |
|---------------|-----------------------------------------------------|-----|-----|-------|
| VI. 12,117    | Cubic feet of masonry, at Rs. 15 per 100 cubic feet | ... | ... | 1,817 |
| 1,672         | Ditto flooring, at Rs. 15 per 100 cubic feet        | ... | ... | 251   |
| 2,025         | Ditto dry stone-work, at Rs. 8 per 100 cubic feet   | ... | ... | 162   |
| 72            | Ditto wood-work, at Rs. 3 per foot                  | ... | ... | 216   |
|               | Blocks and Tackling                                 | ... | ... | 50    |
|               | Contingencies at 5 per cent.                        | ... | ... | 124   |
| Total ... Rs. |                                                     |     |     | 2,620 |
| VII. 12,117   | Cubic feet of masonry, at Rs. 15 per 100 cubic feet | ... | ... | 1,817 |
| 1,232         | Ditto flooring, at Rs. 15 per 100 cubic feet        | ... | ... | 185   |
| 1,200         | Ditto dry stone-work, at Rs. 8 per 100 cubic feet   | ... | ... | 96    |
| 49            | Ditto wood-work, at Rs. 3 per foot                  | ... | ... | 147   |
|               | Blocks and Tackling                                 | ... | ... | 50    |
|               | Contingencies at 5 per cent.                        | ... | ... | 115   |
| Total ... Rs. |                                                     |     |     | 2,410 |

*B. Branch heads for Channels, Classes VIII. to X.*

|                                     | No. | L.   | B.            | D.             | Total. |
|-------------------------------------|-----|------|---------------|----------------|--------|
| <i>Masonry.</i>                     |     |      |               |                |        |
| Redan shaped walls, Class VIII. ... | 2   | 50   | 3             | 8              | 2,400  |
| Ditto Class IX. ... ..              | 2   | 45   | 2.5           | 7              | 1,575  |
| Ditto Class X. ... ..               | 2   | 40   | 2             | 6              | 960    |
| <i>Wood-work.</i>                   |     |      |               |                |        |
| Class VIII.                         |     |      |               |                |        |
| Beams ... ..                        | 4   | 18   | 0.5           | 0.33           | 12     |
| Planks (2 × 16) ... ..              | 32  | 4    | 1             | $\frac{1}{16}$ | 8      |
| Total Wood-work of 8th class...     | ... | ...  | ...           | ...            | 20     |
| Class IX.                           |     |      |               |                |        |
| Beams ... ..                        | 4   | 13.5 | $\frac{3}{8}$ | .33            | 6.75   |
| Planks (2 × 12) ... ..              | 24  | 13.5 | 1             | $\frac{1}{16}$ | 4.66   |
| Total ... ..                        | ... | ...  | ...           | ...            | 11.41  |
| Class X.                            |     |      |               |                |        |
| Beams ... ..                        | 4   | 8    | .33           | .25            | 2.66   |
| Planks ... ..                       | 14  | 3    | 1             | $\frac{1}{24}$ | 1.75   |
| Total ... ..                        | ... | ...  | ...           | ...            | 4.41   |
| <i>Dry Stone-work.</i>              |     |      |               |                |        |
| Class VIII. ... ..                  | 2   | 25   | 15            | 2              | 1,500  |
| Class IX. ... ..                    | 2   | 20   | 12            | 2              | 960    |
| Class X. ... ..                     | 2   | 12   | 10            | 1.5            | 360    |



## ABSTRACT.

|                                       | CLASS VIII |         | CLASS IX. |         | CLASS X.  |         |
|---------------------------------------|------------|---------|-----------|---------|-----------|---------|
|                                       | Quantity.  | Rupees. | Quantity. | Rupees. | Quantity. | Rupees. |
| Masonry, at Rs. 15 per 100 cubic feet | 2,400      | 360     | 1,575     | 236     | 960       | 144     |
| Dry stone work, at Rs. 8 per 100      | 1,500      | 120     | 960       | 77      | 360       | 29      |
| Wood work, at Rs. 3 per foot ...      | 20         | 60      | 11 11     | 35      | 4 11      | 14      |
| Contingencies at 5 per cent ...       | ...        | 27      | ...       | 17      | ...       | 9       |
| Total Rs ..                           |            | 567     | ...       | 365     | ...       | 196     |

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No. 15, DISTRIBUTARIES (SEE PLATE XXI.)

A. Channel Head.

	No.	L.	B.	D.	Total.
<i>Masonry.</i>					
Foundation walls below flooring...	2	32	2	3.5	448
Ditto ditto ...	2	6	2	3.5	84
Flooring over all ...	1	32	10	1.5	480
Side walls, 1st ...	2	30	2	1.5	182
Ditto 2nd ...	2	26	2	1.5	156
Ditto 3rd ...	2	22	2	1.5	132
Ditto 4th ...	2	18	2	1.5	108
Arch and covering, taken solid to spring ...	1	19	6	3.5	399
Cross walls, front ...	1	6	3.5	6	126
Ditto rear ...	1	6	1.5	6	54
Parapets ...	2	10	1.5	3	90
Total Masonry ...	...	...	...	...	2,259
A sluice board with gear...	1	6	2.5	0.125	2
Metalling, say ...	1	20	16	0.5	160

ABSTRACT.

Rs.

2,259 Cubic feet of masonry, at Rs. 15 per 100 cubic feet ...	...	...	...	339
160 Ditto metalling, at Rs. 6 per 100 cubic feet ...	...	...	...	10
2 Sluice board and gear ...	...	...	...	25
Contingencies at 5 per cent. ...	...	...	...	19

Total cost for one Channel head ... Rs. 393

B. Channels (per mile.)

	No.	L.	B.	D.	Total.
<i>Earth-work.</i>					
Channel, 1 mile ...	1	5,280	Mean. 10	4	211,200

ABSTRACT.

Rs.

211,200 Cubic feet of earth-work, at Rs. 1.8 per 1,000 cubic feet ...	...	...	...	317
Contingencies at 5 per cent. ...	...	...	...	16

Total cost per mile of Channel ... Rs. 333

C Falls

	No.	L.	B.	D.	Total.
<i>Masonry</i>					
Floor of well	1	20 x 7854	20	2	600
Walls of ditto (taking the tall steps as agreed to completing the circle)	1	271 x 31116	25	115	2533
Front curtain wall	1	20	2	3	100
Wing walls upper	2	1025 x 31116 x 0.25 x 15	7		173
Flooring between ditto	1	8	$\frac{20+8}{2}$	15	164
Bridge abutment walls	2	11	25	2	110
Ditto all between spring of arch and upper floor solid	1	10	11	35	400
Ditto foundation of abutment	2	11	25	3	160
Ditto curtain wall	1	7	15	3	51
Flooring	1	11	7	15	115
Wing wall straight	2	5	2	10	200
Ditto end	2	7 x 31116 x 0.25 x 2	8		170
Parapets over bridge	2	11	2	25	110
Total Masonry					4991
Excavation	1	21 x 7854	25	115	6553

ABSTRACT

4991 Cubic feet of masonry at Rs. 15 per 100 cubic feet	748
6553 Ditto of earth work at Rs. 4 per 100 cubic feet	262
Contingencies at 5 per cent.	33

Total cost Rs. 813

D Metal Work

Excavation of 2 ramps 40 x 30 x 4 x 0.5 = 4800 cubic feet at Rs. 1.5 per 1000	72
Metal 70 x 40 x 0.75 = 2100 cubic feet at Rs. 6 per 100 cubic feet	126
Iron 100 feet of plate wood 100 x 10 x 10 x 10	2
Contingencies at 5 per cent.	4

Total Rs. 9

No. 15, DISTRIBUTARIES (SEE PLATE XXI.)

A. Channel Head.

	No.	L.	B.	D.	Total.
<i>Masonry.</i>					
Foundation walls below flooring...	2	32	2	3.5	448
Ditto ditto ...	2	6	2	3.5	84
Flooring over all ...	1	32	10	1.5	480
Side walls, 1st ...	2	30	2	1.5	182
Ditto 2nd ...	2	26	2	1.5	156
Ditto 3rd ...	2	22	2	1.5	132
Ditto 4th ...	2	18	2	1.5	108
Arch and covering, taken solid to spring ...	1	19	6	3.5	399
Cross walls, front ...	1	6	3.5	6	126
Ditto rear ...	1	6	1.5	6	54
Parapets ...	2	10	1.5	3	90
Total Masonry ...	...	...	...	...	2,259
A sluice board with gear...	1	6	2.5	0.125	2
Metalling, say ...	1	20	16	0.5	160

ABSTRACT.

Rs.

2,259 Cubic feet of masonry, at Rs. 15 per 100 cubic feet ...	...	...	...	339
160 Ditto metalling, at Rs. 6 per 100 cubic feet ...	...	...	...	10
2 Sluice board and gear ...	...	...	...	25
Contingencies at 5 per cent. ...	...	...	...	19

Total cost for one Channel head ... Rs. 393

B. Channels (per mile.)

	No.	L.	B.	D.	Total.
<i>Earth-work.</i>					
Channel, 1 mile ...	1	5,280	Mean. 10	4	211,200

ABSTRACT.

Rs.

211,200 Cubic feet of earth-work, at Rs. 1-8 per 1,000 cubic feet ...	...	...	...	317
Contingencies at 5 per cent. ...	...	...	...	16

Total cost per mile of Channel ... Rs. 333

C. Falls.

	No	L.	B	D	Total
<i>Masonry</i>					
Floor of well ...	1	20 × 7654	20	2	625
Walls of ditto (taking the tail steps as agreed to completing the circle) ..	1	22½ × 31416	25	145	2533
Front curtain wall ..	1	20	2	3	120
Wing walls, upper	2	1025 × 31416 × 0.25 × 15	7		173
Flooring between ditto	1	8	$\frac{20+8}{2}$	15	168
Bridge abutment walls ..	2	11	25	2	110
Ditto all between spring of arch and upper floor, solid	1	12	11	35	462
Ditto foundation of abutment .	2	11	25	3	165
Ditto curtain wall ...	1	7	15	3	31
Flooring ..	1	11	7	15	115
Wing wall, straight ..	2	6	2	10	200
Ditto end ..	2	7 × 31416 × 25 × 2	8		176
Parapets over bridge ..	2	11	2	25	110
Total Masonry ...	...				4991
Excavation ..	1	24 × 7654	24	145	6559

ABSTRACT.

	Rs
4,991 Cubic feet of masonry, at Rs. 15 per 100 cubic feet ...	749
6,559 Ditto of earth work, at Rs. 4 per 1,000 cubic feet	26
Contingencies at 5 per cent. ..	30
Total cost	Rs 618

D. Metalled Fords

	Rs
Excavation of 2 ramps, 40 × 30 × 4 × 0.5 = 6,000 cubic feet, at Rs. 1.5 per 1,000	9
Metalling, 70 × 40 × 0.75 = 980 cubic feet, at Rs. 6 per 100 cubic feet ...	59
Fencing 100 feet of jungle wood fence, at 4 annas a foot ..	25
Contingencies at 5 per cent. ..	4
Total	Rs 98

E. Bridges.

	No.	L.	B.	D.	Total.
<i>Masonry.</i>					
Body of bridge taken solid ...	1	19	13	8·5	2,099
Deduct Hollow under flooring ...	1	16	6	2	192
	1	19	7	2	266
					— 458
					1,641
Wing wall	4	4	2	5·5	176
Ditto	4	5	2	2	80
Parapets	2	13	1·5	2·5	97
Ditto	4	9	1·5	2·5	135
					488
Total Masonry ...	...	...	...	...	2,129

ABSTRACT.

					Rs.
2,129	Cubic feet of masonry, at Rs. 15 per 100 cubic feet	...	...	...	319
	Contingencies, at 5 per cent.	...	...	...	16
	Total for a bridge	...	...	...	Rs. 335

F. Escapes.

	No.	L.	B.	D.	Total.
<i>Masonry.</i>					
Side wall below flooring, straight.	2	9	2·5	3	135
Ditto ditto curved ...	4	4·75 × 3·14	2·5	3	450
Curtain wall	2	15	1·5	3	135
Flooring	1	10	8·5	1·5	127
Ditto	1	12	8	2	192
Ditto over lap	1	7	2	0·5	7
Abutment wall	2	3	2·5	5	75
Bridge, solid, above spring	1	7	3	3	63
Straight wall below bridges	2	6	3·5	5	210
Ditto steps	2	6	2·5	1	30
Wing Walls	4	4·75 × 3·14	2·5	5	745
Total Masonry ..	...	...	...	...	2,169
Dry Stone with piles ...	1	15	8	2	240
Total ...	...	...	...	...	240

ABSTRACT.

					Rs.
2,100	Cubic feet of masonry, at Rs 15 per 100 cubic feet	...	...	...	325
210	Ditto of dry stone work, at Rs. 8 per 100 cubic feet...	...	...	...	19
	Contingencies	...	...	...	17
Total for an Escape...					Rs. 361

G. Aqueduct.

	No.	L.	B.	D.	Total
Masonry					
Foundation abutment of piers	4	17	5	2	680
Ditto ditto	2	17	45	2	306
Ditto ditto	2	17	4		272
Curtain walls	6	8	2		192
Ditto	6	9	2		216
Flooring under bridge	3	9	7	15	283
Abutment to spring	2	11	4	5	410
Ditto behind skew back	2	11	35	1	77
Ditto spandril	2	11	3	45	297
Piers to spring	2	11	3	5	330
Ditto	2	11	2	1	44
Ditto	8	3	2×0.66	5	234
Corbels ditto	8	3	2×0.33	1	24
Arches	3	12	7	15	378
Span brills	3	$(11 \times 15 - 215)$		2	584
Over pier between spandrills	2	11	1	35	117
Wing walls, straight	4	7	2	115	611
Ditto ditto	4	4	2	65	204
Ditto curved	4	7×3.11	2	35	308
		2			
Curtain wall of aqueduct	2	15	2	3	140
Flooring in wings	2	11	7	15	211
Ditto	2	6	10	15	140
Parapets	2	66	2	25	660
Ditto	2	7×3.11	2	25	110
		2			
Total Masonry	..	..	..	..	6,923
Excavation	1	11	5	65	3,620

ABSTRACT

				Rs.
3,620	Cubic feet of earth work, at Rs. 4 per 1,000 cubic feet	..	..	14
6,923	Ditto of masonry, at Rs. 15 per 100 cubic feet	...	...	1,038
	Contingencies at 5 per cent.	-	-	52
Total for Aqueduct				Rs. 1,111

II. Syphon Drains.

	No.	L.	B.	D.	Total.
<i>Masonry.</i>					
Wing walls, lower channel curved.	4	$7 \times \frac{3 \cdot 14}{2}$	2	6	527
Ditto ditto straight	4	4	2	6	192
Ditto ditto ditto	4	7	2	8·5	476
Steps, lower channel ...	2	7	3	3	126
Ditto ...	2	7	1	2	28
Ditto ...	2	7	3	3·5	147
Ditto ...	2	7	1	1	14
Ditto ...	2	7	2	2·5	70
Flooring of lower channel ...	1	15	7	1·5	157
Abutments of arch ...	2	11	2	4·5	198
Arch to floor taken solid ...	1	11	10	3·5	385
Parapet walls over arch ...	2	11	2	2·5	110
Wing walls of upper channel ...	4	6	2	5	240
Ditto curved parts ...	4	$7 \times \frac{3 \cdot 14}{2}$	2	5	439
Flooring ...	2	5	7	1	70
Curtain walls ...	2	7	1·5	2·5	52
Total Masonry ...	.....	.. ..	.....	.....	3,231
<i>Excavation.</i>					
Say ...	1	33	7	5·5	1,270
And ...	4	11	2	3	264
Also ...	4	17	2	2·5	340
					1,874
ABSTRACT.					Rs.
3,231	Cubic feet of masonry, at Rs. 15 per 100 cubic feet	...	...	...	485
1,874	Ditto of earth-work, at Rs. 2 per 1,000 cubic feet	...	...	...	4
	Contingencies at 5 per cent.	...	...	...	24
Total					Rs. 513

*K. Village Water-course head, or Molule
(Hindustani "Pymana")*

	No	L	B	D	Total
<i>Masonry</i>					
Long walls	2	17 5	1	25	87 5
Ditto above	2	$\frac{15 5 + 11 5}{2}$	1	3	81 0
Curtain walls	2	25	1	15	75
Flooring	1	15	25	05	19 5
Cross walls, front	1	25	15	15	100
Ditto rear	1	25	1	45	112 5
Total Masonry					223
<i>Stone work</i>					
Groove	2	3	1	1	6
Slab	1	2	2	05	2
Inlets	1	15	15	033	1
Ditto	1	1	1	033	0 66
Road way slabs	1	5	45	05	112 5
Total Stone work					21

ABSTRACT


223 Cubic feet of masonry at 1 s. 15 per 100 cubic feet	1 s.	33
21 Ditto of stone work at 1 s. 60 per 100 cubic feet		10
1 8 in. plank		12 12
Contingencies at 5 per cent.		
Total	1 s.	47

GENERAL ABSTRACT FOR ONE MILE OF DISTRIBUTARIES

<i>In each mile</i>				
Earth work	"	"	"	333
One head	"	"	"	(5)
One village water-course head	"	"	"	272
Total in each mile				706
<i>In ten miles</i>				
Two heads	"	"	"	25
Two falls	"	"	"	15 3
One cross wall	"	"	"	501
One aqueduct	"	"	"	1111
One 8 1/2' m drain	"	"	"	513
One bridge	"	"	"	33
One tail fall, same cost as head	"	"	"	272
Total				5125
Of which cross-walls				512
Total cost per mile				1217

This estimate is only intended to show how the cost may possibly be made up. In practice it has been found in the Ganges Canal Works that the Rajbuhals or Distributaries cost about Rs. 1,000 per mile; and Rs. 1,200 seems a fair amount to assume for the Soane Canals.

The land at 50 feet width will come to about 6 acres, a little short of 10 beegahs per square mile, which at the average rate assumed will cost Rs. 60, and Rs. 40 more may be added for clearing, fencing, &c.; so that on the whole I take the cost of Distributaries or Rajbuhals at Rs. 1,300 per mile.



No 16

ACCOUNT OF THE EXPENDITURE ON THE PRELIMINARY SURVEY OF THE SOANE
CANALS AND OTHER IRRIGATION PROJECTS FOR SHAHABAD AND BEHAR.*First Survey of 1854-55*

Rs. A. P.

	Rs.	A.	P.
Salary of Superintendent, 6 months, at Rs. 500	3,000	0	0
Salaries of Native Levellers, Writers and Draftsmen	1,330	13	11
Wear and tear of Instruments	716	11	6
			5,077 9 1

Operations from December 1855 to March 1859

Salaries of all classes	29,609	8	0
Travelling allowances	3,309	0	0
Contingent charges	670	12	10
Wear and tear of instruments	321	2	7
Loss of instruments in the mutinies	1,630	14	2
Construction and repair of Jungahs for the shelter of the Establishment at various spots	11,106	0	8
			46,108 15 3
Small Establishment kept up from March 1859 to December 1860	3,171	11	1

From December 1860 to August 1861

Salaries	12,730	1	5
Travelling allowances	458	3	0
Contingent charges	601	10	4
Printing Maps	1,410	8	0
Printing Report and Estimates	1,002	5	0
			2,112 17 9
			16,200 15 6
			Grand total Rs. 70,563 6 2

~~~~~  
GENERAL ESTIMATE.

I have not thought it necessary to print the calculations upon which the following details are based. The reader who is so inclined will have no difficulty in following most of the details set down, being guided by the Report and the several detailed Estimates in the Appendix. It only appears necessary to explain that the number of bridges is fixed at 3 per mile or rather more, but in this calculation the bridges at the locks and falls are counted; so that a canal of 24 miles long having 3 locks and falls would have 7 bridges in all (11, making 8 points of cross communication). The falls are of course given in accordance with the Sections for the lines of which the levels have been taken. For the remaining lines they are taken from a calculation of the excess of the total fall of the country over that intended to be given to the canal bed, the former being taken from the sketched contours on Plate III.

*Head Works.*

|                                                                                                                              | Rs.              | Rs. |
|------------------------------------------------------------------------------------------------------------------------------|------------------|-----|
| Land, 800 beegahs, at Rs. 6 ... ..                                                                                           | 4,800            |     |
| Plantations, one-sixth cost of land ... ..                                                                                   | 800              |     |
| Roads and fences, say 10 miles, at Rs. 300 ... ..                                                                            | 3,000            |     |
|                                                                                                                              | <u>8,600</u>     |     |
| Temporary quarters, 1 Superintending Engineer, 1 Executive, 3 Assistants, 15 Subordinates and Clerks; plus one-fourth ... .. | 14,750           |     |
| Western lock channel head ... ..                                                                                             | 1,33,973         |     |
| Eastern ditto ... ..                                                                                                         | 60,151           |     |
| Temporary dam ... ..                                                                                                         | 2,24,469         |     |
| Workshops ... ..                                                                                                             | 50,000           |     |
| Permanent quarters ... ..                                                                                                    | 62,000           |     |
| Ditto dam ... ..                                                                                                             | 11,29,269        |     |
| Western Canal head bridge ... ..                                                                                             | 1,46,346         |     |
| Eastern ditto ... ..                                                                                                         | 34,462           |     |
| Rails, rolling stock, and other plant ... ..                                                                                 | 2,50,000         |     |
|                                                                                                                              | <u>21,14,020</u> |     |
| Establishment at 12½ per cent. ... ..                                                                                        | 2,64,252         |     |
|                                                                                                                              | <u>23,78,272</u> |     |
| 30 per cent. added to cover probable rise of prices ... ..                                                                   | 6,34,206         |     |
| Total estimated outlay ... ..                                                                                                | <u>30,12,478</u> |     |

*Western Canal, Main Line (A).*

10½ miles long, with 5 miles of escape; width at bottom 73 feet; depth of water 7½ feet; fall of bed per mile 0·75 foot; discharge 1,980 cubic feet per second.

|                                                                                                                                    | Rs.              |
|------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Land, 7 miles at Rs. 845 ... ..                                                                                                    | 5,915            |
| Land, 8½ miles at Rs. 563 ... ..                                                                                                   | 4,645            |
| Plantations, one-sixth cost of land ... ..                                                                                         | 1,760            |
| Roads and fences, 15½ miles at Rs. 400 ... ..                                                                                      | 6,100            |
| Excavation ... ..                                                                                                                  | 5,73,381         |
| 5 Inlets of 10 feet water-way with drop ... ..                                                                                     | 20,000           |
| 2 Ditto 20 ditto ditto ... ..                                                                                                      | 10,400           |
| Toofla drainage works ... ..                                                                                                       | 3,10,980         |
|                                                                                                                                    | <u>3,41,380</u>  |
| 2 Bridges over deep cutting ... ..                                                                                                 | 53,000           |
| 4 Ordinary bridges ... ..                                                                                                          | 76,000           |
|                                                                                                                                    | <u>1,29,000</u>  |
| Escape head, 8 openings ... ..                                                                                                     | 14,000           |
| 4 Falls of 100 feet water-way on escape to bring it to the level of the Soane, which provide sufficient cross communication ... .. | 1,40,000         |
|                                                                                                                                    | <u>1,54,000</u>  |
| Carried over ... ..                                                                                                                | <u>12,16,181</u> |

|                                                                                                                                                    |                    |                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------------|
|                                                                                                                                                    | Brought forward... | Rs.<br>13,16,151 |
| 10 Miles of Distributaries, at Rs. 1,300 per mile ...                                                                                              |                    | 13,000           |
| 1 First Class Chokree, Rs. 2,000; one Second Class Chokree, Rs. 800; 1 Assistant Engineer's Rs. 6,250, and three Overseers' quarters Rs. 7,575 ... |                    | 15,925           |
|                                                                                                                                                    |                    | <hr/> 12,45,166  |
| Establishment at 12½ per cent. ...                                                                                                                 |                    | 1,55,638         |
|                                                                                                                                                    |                    | <hr/> 11,00,744  |
| 30 per cent. added ...                                                                                                                             |                    | 3,73,532         |
|                                                                                                                                                    |                    | <hr/> 17,74,276  |

*Arrah Branch, upper (B).*

|                                                                                                                                                                    |        |                          |                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------------|----------------------|
| 22 miles in length with 1½ miles of escape; width at bottom 42½ feet; depth of water 5½ feet; fall of bed per mile 1·01 feet; discharge 877 cubic feet per second. |        |                          |                      |
| Land for 23½ miles of Canal, at Rs. 422 per mile ...                                                                                                               | Rs.    | Rs.                      |                      |
| Ditto 32 bighas for Executive Engineer's Head Quarters ...                                                                                                         | 102    |                          |                      |
| Ditto for six locks ...                                                                                                                                            | 6,012  |                          |                      |
|                                                                                                                                                                    |        |                          | 17,021               |
| Plantations, one-sixth cost of land ...                                                                                                                            |        |                          | 2,070                |
| Roads and Fences, 23½ miles at Rs. 250 ...                                                                                                                         |        |                          | 5,875                |
| Excavation ...                                                                                                                                                     |        |                          | 1,75,151             |
| 1 Siphon drain for the Nowadech Nala ...                                                                                                                           |        |                          | 50,000               |
| 1 Bridge at head, Class III, with regulating apparatus ...                                                                                                         | 10,100 |                          |                      |
| 1½ Bridges, to cover cost of one larger bridge on Grand Trunk Road ...                                                                                             | 21,000 |                          |                      |
| 8 Four feet culverts under approaches to bridges ...                                                                                                               | 3,760  |                          |                      |
| Escape head, of 6 openings ...                                                                                                                                     | 12,600 |                          | 40,860               |
| 2 Falls of 60 feet water-way (to bring escape to level of the Sane) at ...                                                                                         | 40,000 |                          |                      |
|                                                                                                                                                                    |        |                          | <hr/> 62,600         |
| 6 Falls with barrier bridges, double locks, and navigable channels ...                                                                                             |        | Irrigation<br>Navigation | 1,62,000<br>2,73,600 |
| 100 Miles of distributaries at Rs. 1,300 per mile, for an irrigation area of 119 square miles ...                                                                  |        |                          | 1,30,000             |
| 6 Mills of two houses each, at Rs. 2,200 ...                                                                                                                       |        |                          | 13,200               |
| 2 First Class Chokrees, Rs. 4,000; 6 Second Class ditto Rs. 4,500, 5 Overseers' quarters Rs. 13,125, including both temporary and permanent ...                    | 21,925 |                          |                      |
| Quarters for Executive Engineer and Officer, and workshops, including permanent and temporary quarters ...                                                         | 23,750 |                          |                      |
|                                                                                                                                                                    |        |                          | <hr/> 47,675         |
| Carried over ...                                                                                                                                                   |        |                          | <hr/> 9,70,532       |

|                                               |                     | Rs,             |
|-----------------------------------------------|---------------------|-----------------|
|                                               | Brought forward ... | 9,70,552        |
| Establishment at $12\frac{1}{2}$ per cent.    | ... ..              | 1,21,319        |
|                                               |                     | <hr/> 10,91,871 |
| 30 per cent. added to meet rise of prices ... | ... ..              | 2,91,166        |
|                                               |                     | <hr/>           |
| Total                                         | :                   | 13,83,037       |
|                                               |                     | <hr/>           |

*Arrah Branch, second portion (C).*

$7\frac{1}{2}$  miles, with 4 miles of escape; width at bottom 31 feet; depth of water  $4\frac{3}{4}$  feet; fall per mile 1.25 feet; discharge, 576 cubic feet per second.

|                                                                                       |                |
|---------------------------------------------------------------------------------------|----------------|
| Land for $11\frac{1}{2}$ miles of canal at Rs. 282 ... ..                             | 3,243          |
| Plantations ... ..                                                                    | 540            |
| Roads and Fences at Rs. 250 per mile ... ..                                           | 2,875          |
| Excavation ... ..                                                                     | 62,093         |
| 1 Inlet on level, of 20 feet water-way ... ..                                         | 3,000          |
| 1 Escape 30 ditto ... ..                                                              | 6,500          |
| $2\frac{1}{4}$ Bridges, Class IV., (the $\frac{1}{4}$ to allow for district road) ... | 22,500         |
| 4 Four feet culverts in approaches to bridges ... ..                                  | 1,880          |
| Regulating gear for head bridge ... ..                                                | 1,685          |
| Escape dam, 4 openings ... ..                                                         | 7,750          |
| 1 Fall of 40 feet water-way on escape ... ..                                          | 11,500         |
| 2 Locks with double chambers and waste { Irrigation                                   | 31,000         |
| weirs, at ... .. { Navigation                                                         | 59,800         |
| 2 Mills of 2 houses each, at Rs. 2,200 ... ..                                         | 4,400          |
| 24 Miles of distributary, at Rs. 1,300 per mile for 35 square miles of area ... ..    | 31,200         |
| 1 First Class and 2 Second Class Chokees, and one Overseers quarters                  | 5,425          |
|                                                                                       | <hr/> 2,55,391 |
| Establishment at $12\frac{1}{2}$ per cent. ... ..                                     | 31,923         |
|                                                                                       | <hr/> 2,87,314 |
| 30 per cent. added to cover rise in prices ... ..                                     | 76,617         |
|                                                                                       | <hr/>          |
| Total ...                                                                             | 3,63,931       |
|                                                                                       | <hr/>          |

*Arrah Branch, third part (D).*

Length of Canal  $15\frac{1}{2}$  miles, with two miles of escape; width at bottom 23 feet; depth of water  $3\frac{3}{4}$  feet; fall per mile 1.54 feet; discharge 335 cubic feet per second.

|                                                       | Rs.   |
|-------------------------------------------------------|-------|
| Land $17\frac{1}{2}$ miles at Rs. 255 per mile ... .. | 4,462 |
| Plantations ... ..                                    | 737   |
|                                                       | <hr/> |
| Carried over ...                                      | 5,199 |

|                                                                                             |                 |     |        | Rs.      |
|---------------------------------------------------------------------------------------------|-----------------|-----|--------|----------|
|                                                                                             | Brought forward | ... |        | 5,199    |
| Roads and Fences at Rs. 250 per mile                                                        | ...             | ..  |        | 4,375    |
| Excavation                                                                                  | ...             | ... |        | 63,277   |
| 2 Inlets of 20 feet opening on level                                                        | ...             | .   | 6,000  |          |
| 1 Escape of 30 ditto                                                                        | ...             | ... | 19,500 |          |
|                                                                                             |                 |     | <hr/>  | 25,500   |
| 1 Inlet of 100 feet                                                                         | ..              | ... | 7,000  |          |
| 1 Escape of 150 feet                                                                        | ..              | ... | 14,250 |          |
|                                                                                             |                 |     | <hr/>  | 21,250   |
| 3 Bridges, Class V., including one with regulating gear at head                             | ..              |     |        | 24,500   |
| 6 Four feet culverts in approaches to bridges                                               | ...             |     |        |          |
| 2 Falls of 30 feet water way on escape                                                      | ...             | ..  |        | 15,000   |
| 3 Double Locks { Irrigation                                                                 | ...             | ... |        | 21,500   |
| { Navigation                                                                                | ...             | ... |        | 91,500   |
| 3 Sets of Mills, at Rs. 2,500                                                               | .               | ... |        | 7,500    |
| 2 Miles of Distributary, at Rs. 1,200 per mile, for 62 square miles of area to be irrigated | ..              | ... |        | 51,600   |
| 1 First and 3 second Class Chokeys, and residence for one Overseer                          |                 |     |        | 7,025    |
|                                                                                             |                 |     | <hr/>  | 3,15,326 |
| Establishment at 12½ per cent.                                                              | ..              |     |        | 43,166   |
|                                                                                             |                 |     | <hr/>  | 3,58,492 |
| 30 per cent. added as before                                                                |                 |     |        | 1,07,548 |
|                                                                                             |                 |     | <hr/>  |          |
|                                                                                             | Total           |     |        | 4,66,040 |

*Arack Branch, last part (F)*

20½ miles in length, including tail escape; width at bottom 18½ feet; depth of water 3½ feet; fall per mile 1.75 feet; discharge Rs. 243 cubic feet per second.

|                                                                                           |             |     |       | Pk.      |
|-------------------------------------------------------------------------------------------|-------------|-----|-------|----------|
| Land for 20½ miles at Rs. 231                                                             | ..          | ... |       | 4,375    |
| Plantations                                                                               | ..          | .   |       | 722      |
| Roads and Fences, at Rs. 250 per mile                                                     | ..          | ..  |       | 5,125    |
| Excavation                                                                                | ..          | ... |       | 23,181   |
| 3½ Bridges, Class VI., one with regulating apparatus                                      | ...         | ..  |       | 27,250   |
| 6 Four feet culverts in approaches to bridges                                             | ..          | ..  |       | 2,520    |
| 5 Single locks, including tail lock { Irrigation                                          | ...         | ..  |       | 27,500   |
| { Navigation                                                                              | ...         | .   |       | 1,10,000 |
| Possible mill for navigation in the Banas                                                 | ..          | ..  |       | 1,20,000 |
| 5 Sets of Mills, at Rs. 2,500 each                                                        | ...         | ... |       | 12,500   |
| 20 Miles of Distributaries, at Rs. 1,200 per mile, for 123 square miles of irrigated area | ..          | .   |       | 1,01,000 |
|                                                                                           |             |     | <hr/> |          |
|                                                                                           | Grand total | ..  |       | 4,78,000 |

|                                               |     | Rs,       |
|-----------------------------------------------|-----|-----------|
| Brought forward ...                           | ... | 9,70,552  |
| Establishment at $12\frac{1}{2}$ per cent.    | ... | 1,21,319  |
|                                               |     | <hr/>     |
| 30 per cent. added to meet rise of prices ... | ... | 10,91,871 |
|                                               |     | <hr/>     |
| Total                                         | :   | 13,83,037 |
|                                               |     | <hr/>     |

*Arrah Branch, second portion (C).*

|                                                                                                                                                   |                            |     |          |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----|----------|
| 7½ miles, with 4 miles of escape; width at bottom 31 feet; depth of water 4½ feet; fall per mile 1.25 feet; discharge, 576 cubic feet per second. |                            |     |          |
| Land for 11½ miles of canal at Rs. 282                                                                                                            | ...                        | ... | 3,243    |
| Plantations                                                                                                                                       | ...                        | ... | 540      |
| Roads and Fences at Rs. 250 per mile                                                                                                              | ...                        | ... | 2,875    |
| Excavation                                                                                                                                        | ...                        | ... | 62,093   |
| 1 Inlet on level, of 20 feet water-way                                                                                                            | ...                        | ... | 3,000    |
| 1 Escape 30 ditto                                                                                                                                 | ...                        | ... | 6,500    |
| 2½ Bridges, Class IV., (the ½ to allow for district road)                                                                                         | ...                        | ... | 22,500   |
| 4 Four feet culverts in approaches to bridges                                                                                                     | ...                        | ... | 1,880    |
| Regulating gear for head bridge                                                                                                                   | ...                        | ... | 1,685    |
| Escape dam, 4 openings                                                                                                                            | ...                        | ... | 7,750    |
| 1 Fall of 40 feet water-way on escape                                                                                                             | ...                        | ... | 11,500   |
| 2 Locks with double chambers and waste                                                                                                            | { Irrigation<br>Navigation | ... | 31,000   |
| weirs, at                                                                                                                                         |                            | ... | 59,800   |
| 2 Mills of 2 houses each, at Rs. 2,200                                                                                                            | ...                        | ... | 4,400    |
| 24 Miles of distributary, at Rs. 1,300 per mile for 35 square miles of area                                                                       | ...                        | ... | 31,200   |
| 1 First Class and 2 Second Class Chokees, and one Overseers quarters                                                                              |                            |     | 5,425    |
|                                                                                                                                                   |                            |     | <hr/>    |
|                                                                                                                                                   |                            |     | 2,55,391 |
| Establishment at $12\frac{1}{2}$ per cent.                                                                                                        | ...                        | ... | 31,923   |
|                                                                                                                                                   |                            |     | <hr/>    |
|                                                                                                                                                   |                            |     | 2,87,314 |
| 30 per cent. added to cover rise in prices                                                                                                        | ...                        | ... | 76,617   |
|                                                                                                                                                   |                            |     | <hr/>    |
| Total                                                                                                                                             | ...                        |     | 3,63,931 |
|                                                                                                                                                   |                            |     | <hr/>    |

*Arrah Branch, third part (D).*

Length of Canal  $15\frac{1}{2}$  miles, with two miles of escape; width at bottom 23 feet; depth of water  $3\frac{3}{4}$  feet; fall per mile 1.54 feet; discharge 335 cubic feet per second.

|                                                |     | Rs.   |
|------------------------------------------------|-----|-------|
| Land $17\frac{1}{2}$ miles at Rs. 255 per mile | ... | 4,462 |
| Plantations                                    | ... | 737   |
|                                                |     | <hr/> |
| Carried over ...                               |     | 5,199 |



|                                                                                              |                 | Rs.      |
|----------------------------------------------------------------------------------------------|-----------------|----------|
|                                                                                              | Brought forward | 5 199    |
| Roads and Fences at Rs. 250 per mile                                                         |                 | 4 375    |
| Excavation                                                                                   |                 | 63 277   |
| 2 Inlets of 20 feet opening on level                                                         | 6 000           |          |
| 3 Escapes 30 d tto                                                                           | 19 500          |          |
|                                                                                              | <hr/>           | 25 500   |
| 1 Inlet of 100 feet                                                                          | 7 000           |          |
| 1 Escape of 150 feet                                                                         | 14,250          |          |
|                                                                                              | <hr/>           | 21 250   |
| 3 Bridges Class V including one with regulating gear at head                                 |                 | 28 500   |
| 6 Four feet culverts in approaches to bridges                                                |                 |          |
| 2 Falls of 30 feet water way on escape                                                       |                 | 15 000   |
| 3 Double locks { Irrigation                                                                  |                 | 27 500   |
| { Navigation                                                                                 |                 | 91 500   |
| 3 Sets of Mills at Rs 2 200                                                                  |                 | 6 600    |
| 42 Miles of Distributaries at Rs 1 300 per mile, for 62 square miles of area to be irrigated |                 | 64 600   |
| 1 First and 3 second Class Chokees, and residence for one Overseer                           |                 | 7 025    |
|                                                                                              |                 | <hr/>    |
|                                                                                              |                 | 3 15 327 |
| Establishment at 12½ per cent.                                                               |                 | 13 166   |
|                                                                                              |                 | <hr/>    |
|                                                                                              |                 | 3,88 492 |
| 30 per cent added as before                                                                  |                 | 1 03 608 |
|                                                                                              |                 | <hr/>    |
|                                                                                              | Total           | 4 92 000 |
|                                                                                              |                 | <hr/>    |

*Arrah Branch last part (E)*

20½ miles in length including tail escape with at bottom 18½ feet depth of water 3½ feet, full per mile 1 75 feet discharge Rs 213 cubic feet per second.

|                                                                                        | Rs.      |
|----------------------------------------------------------------------------------------|----------|
| Land for 20½ miles at Rs. 231                                                          | 13 750   |
| Plantations                                                                            | 725      |
| Roads and Fences at Rs. 250 per mile                                                   | 5 125    |
| Excavation                                                                             | 30 181   |
| 3½ Bridges Class VI one with regulating apparatus                                      | 27 500   |
| 6 Four feet culverts in approaches to bridges                                          | 2 800    |
| 5 Single locks including tail lock { Irrigation                                        | 27 500   |
| { Navigation                                                                           | 1 10 000 |
| Possible addition for navigation in the Banas                                          | 1 50 000 |
| 5 Sets of Mills at Rs 2 200 each                                                       | 11 000   |
| 80 Miles of Distributaries at Rs 1 300 per mile for 123 square miles of irrigated area | 1 04 000 |

|                                                                                                     |                 |     | Rs.      |
|-----------------------------------------------------------------------------------------------------|-----------------|-----|----------|
|                                                                                                     | Brought forward | ... | 4,78,076 |
| 2 First Class and 3 Second Class Chokees, and residences for 1 Assistant Engineer and two Overseers | ...             | ... | 16,900   |
|                                                                                                     |                 |     | <hr/>    |
|                                                                                                     |                 |     | 4,94,976 |
| Establishment at $12\frac{1}{2}$ per cent.                                                          | ...             | ... | 61,872   |
|                                                                                                     |                 |     | <hr/>    |
|                                                                                                     |                 |     | 5,56,848 |
| 30 per cent. added as before...                                                                     | ...             | ... | 1,48,493 |
|                                                                                                     |                 |     | <hr/>    |
| Total                                                                                               | ...             | Rs. | 7,05,341 |
|                                                                                                     |                 |     | <hr/>    |

*Nansaugor Branch (F).*

22½ miles long, including tail escape; width at bottom 8 feet; depth of water 1½ feet; fall per mile 2 feet; discharge 45 cubic feet per second.

|                                                                                                                             |     |     | Rs.      |
|-----------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|
| Land, 22½ miles at Rs. 127½                                                                                                 | ... | ... | 2,869    |
| Plantations ...                                                                                                             | ... | ... | 477      |
| Roads and Fences, at Rs. 150                                                                                                | ... | ... | 3,375    |
|                                                                                                                             |     |     | <hr/>    |
|                                                                                                                             |     |     | 6,721    |
| Excavation ...                                                                                                              | ... | ... | 29,744   |
| 2 Falls of 10 feet water-way, including tail fall                                                                           | ... | ... | 4,000    |
| 4 Bridges, Class IX., at Rs. 1,700, three with regulating apparatus                                                         | ... | ... | 7,895    |
| 8 Three feet culverts in approaches to bridges...                                                                           | ... | ... | 1,600    |
| 18 Metalled Fords, at Rs. 150 each...                                                                                       | ... | ... | 2,700    |
|                                                                                                                             |     |     | <hr/>    |
|                                                                                                                             |     |     | 12,195   |
| 1 First Class and 2 Second Class Chokees                                                                                    | ... | ... | 3,600    |
| 1 Mill                                                                                                                      | ... | ... | 1,300    |
| 16 Miles of Distributary, at Rs. 1,300 a mile, will suffice, with the canal here, to complete the distribution of water ... | ... | ... | 20,800   |
| Modules for village water-course heads, for 22 miles of Canal at Rs. 400 per mile                                           | ... | ... | 8,800    |
|                                                                                                                             |     |     | <hr/>    |
|                                                                                                                             |     |     | 29,600   |
| Total                                                                                                                       | ... | ... | 87,160   |
| Add $12\frac{1}{2}$ per cent. for Establishment                                                                             | ... | ... | 10,895   |
|                                                                                                                             |     |     | <hr/>    |
|                                                                                                                             |     |     | 98,055   |
| Add 30 per cent. as before                                                                                                  | ... | ... | 26,148   |
|                                                                                                                             |     |     | <hr/>    |
| Total                                                                                                                       | ... | Rs. | 1,24,203 |
|                                                                                                                             |     |     | <hr/>    |

*Peeroo Branch, first part (G)*

11½ miles in length, with 6 miles of escape, width at bottom 17 feet, depth of water 3½ feet, fall per mile 18 feet, discharge 214 cubic feet per second.

|                                                                                          |              |          |          |
|------------------------------------------------------------------------------------------|--------------|----------|----------|
| Land                                                                                     | ...          | Rs       | 4,042    |
| Plantations                                                                              | ..           | 673      |          |
| Roads and Fences                                                                         | ...          | 4,375    |          |
| Excavation                                                                               | ...          | 45,018   |          |
| One fall 25 feet water way on escape                                                     | ...          | 5,500    |          |
| 3 Bridges, Class VI, one with regulating apparatus                                       | ..           | 26,600   |          |
| 6 Three feet culverts in approaches to bridges                                           | ..           | 1,200    |          |
| 1 Escape head of 30 feet water way                                                       | .            | 5 000    |          |
| 2 Locks of 60 × 10 at Rs 6,500                                                           | { Irrigation | 11 000   |          |
|                                                                                          | { Navigation | 2,000    |          |
| 53 Miles of Distributary at Rs 1,300 a mile, for 77 square miles of area to be irrigated | ..           | 68,900   |          |
| 2 Mills (single house) at Rs 1,300 each                                                  | .            | 2 600    |          |
| 1 First and 1 Second Class Chokee, 1 Assistant Engineer's and 1 Overseer's residence     | ..           | 10 675   |          |
|                                                                                          |              | 1,67,583 |          |
| Establishment at 12½ per cent                                                            | ..           | 23,448   |          |
|                                                                                          |              | 2,11,031 |          |
| 30 per cent added as before                                                              | .            | 56 274   |          |
| Total cost                                                                               |              | Rs       | 2,67,305 |

*Peeroo Branch, second part (H)*

17½ miles in length, including tail escape, width at bottom 11 feet, depth of water 2½ feet, fall per mile 2 feet, discharge 8½ cubic feet per second.

|                                                                                              |              |          |          |
|----------------------------------------------------------------------------------------------|--------------|----------|----------|
| Land, 17½ miles                                                                              | ..           | 3,360    |          |
| Plantations                                                                                  | ..           | 560      |          |
| Roads and Fences                                                                             | ...          | 2,625    |          |
| Excavation                                                                                   | ..           | 17,949   |          |
| One fall 20 feet water way at tail                                                           | ..           | 4,000    |          |
| 2 Bridges, Class VIII, one with regulator                                                    | ..           | 5,167    |          |
| 4 Three feet culverts in approaches to bridges                                               | .            | 800      |          |
| 4 Locks 60 × 10 at Rs 6,500 each                                                             | { Irrigation | 16 000   |          |
|                                                                                              | { Navigation | 10,000   |          |
| 72 Miles of Distributary, at Rs 1,300 per mile, for 110 square miles of area to be irrigated | ...          | 93,600   |          |
| 4 Mills at Rs 1,300 each                                                                     | ..           | 5,200    |          |
| 1 First and 1 Second Class Chokee, and 1 Overseer's residence                                | ..           | 5,425    |          |
|                                                                                              |              | 1,63,886 |          |
| Establishment at 12½ per cent                                                                |              | 20,486   |          |
|                                                                                              |              | 1,84,372 |          |
| 30 per cent added as before                                                                  | ..           | 49,166   |          |
| Total cost                                                                                   |              | Rs       | 2,33,538 |

*Jugdispoor Branch (I).*

17 Miles in length to tail escape on the Charyee;  $10\frac{1}{2}$  feet wide at bottom; depth of water 2·2 feet; fall per mile 2 feet; discharge 73 feet per second.

|                                                                                                 | Rs.      |
|-------------------------------------------------------------------------------------------------|----------|
| Land at Rs. 166 per mile ...                                                                    | 2,822    |
| Plantations ...                                                                                 | 470      |
| Roads and fences ...                                                                            | 2,550    |
| Excavation ...                                                                                  | 16,965   |
| 1 Bridge, Class VIII., with regulator...                                                        | 2,867    |
| 2 Three feet culverts in approaches to bridge                                                   | 400      |
| 1 Fall of 20 feet water-way at tail ...                                                         | 4,000    |
| 6 Locks of 60 × 10 at Rs. 6,500 each { Irrigation                                               | 24,000   |
| { Navigation                                                                                    | 15,000   |
| 61 Miles of Distributary, at Rs. 1,300 per mile, for 97 square mile of area to be irrigated ... | 83,200   |
| 6 Mills (one house each) at Rs. 1,300 ...                                                       | 7,800    |
| 1 First and 1 Second Class Chocee, and one Overseer's residence ...                             | 5,425    |
|                                                                                                 | <hr/>    |
|                                                                                                 | 1,65,499 |
| 12½ per cent. for Establishment ...                                                             | 20,687   |
|                                                                                                 | <hr/>    |
|                                                                                                 | 1,86,186 |
| 30 per cent. added as before ...                                                                | 49,649   |
|                                                                                                 | <hr/>    |
| Total ...                                                                                       | 2,35,835 |
|                                                                                                 | <hr/>    |

*Raneepoor Branch, upper part (J).*

22 miles in length, with 2 miles escape; width at bottom 16 feet; depth of water 3 feet; fall per mile 1·9 feet; discharge 190 cubic feet per second.

|                                                                                                   | Rs.      |
|---------------------------------------------------------------------------------------------------|----------|
| Land at Rs. 192 a mile, 24 miles ...                                                              | 4,608    |
| Plantations ...                                                                                   | 768      |
| Roads and fences ...                                                                              | 3,600    |
| Excavation ...                                                                                    | 49,363   |
| 1 Escape head, 30 feet water-way ..                                                               | 4,000    |
| 1 Fall at escape tail, 25 feet water-way                                                          | 5,500    |
| 6 Bridges, Class VII., one with regulator ...                                                     | 38,400   |
| 12 Three feet culverts in approaches to bridges                                                   | 2,400    |
| 2 Locks of 60 × 10 at Rs. 6,500 each { Irrigation                                                 | 11,000   |
| { Navigation                                                                                      | 2,000    |
| 2 Mills, single house, at Rs. 1,300 ...                                                           | 2,600    |
| 74 Miles of Distributary, at Rs. 1,300 per mile, for 111 square miles of area to be irrigated ... | 96,200   |
|                                                                                                   | <hr/>    |
| Carried over ...                                                                                  | 2,20,439 |

*Jugdispoor Branch (I).*

17 Miles in length to tail escape on the Charyee;  $10\frac{1}{2}$  feet wide at bottom; depth of water 2·2 feet; fall per mile 2 feet; discharge 73 feet per second.

|                                                                                                    | Rs.      |
|----------------------------------------------------------------------------------------------------|----------|
| Land at Rs. 166 per mile ... ..                                                                    | 2,822    |
| Plantations ... ..                                                                                 | 470      |
| Roads and fences ... ..                                                                            | 2,550    |
| Excavation ... ..                                                                                  | 16,965   |
| 1 Bridge, Class VIII., with regulator...                                                           | 2,867    |
| 2 Three feet culverts in approaches to bridge                                                      | 400      |
| 1 Fall of 20 feet water-way at tail ... ..                                                         | 4,000    |
| 6 Locks of $60 \times 10$ at Rs. 6,500 each { Irrigation                                           | 24,000   |
| Navigation                                                                                         | 15,000   |
| 64 Miles of Distributary, at Rs. 1,300 per mile, for 97 square mile of area to be irrigated ... .. | 83,200   |
| 6 Mills (one house each) at Rs. 1,300 ... ..                                                       | 7,800    |
| 1 First and 1 Second Class Chokey, and one Overseer's residence ...                                | 5,425    |
|                                                                                                    | <hr/>    |
|                                                                                                    | 1,65,499 |
| 12½ per cent. for Establishment ... ..                                                             | 20,687   |
|                                                                                                    | <hr/>    |
|                                                                                                    | 1,86,186 |
| 30 per cent. added as before ... ..                                                                | 49,649   |
|                                                                                                    | <hr/>    |
| Total ... ..                                                                                       | 2,35,835 |
|                                                                                                    | <hr/>    |

*Raneepoor Branch, upper part (J).*

22 miles in length, with 2 miles escape; width at bottom 16 feet; depth of water 3 feet; fall per mile 1·9 feet; discharge 190 cubic feet per second.

|                                                                                                      | Rs.      |
|------------------------------------------------------------------------------------------------------|----------|
| Land at Rs. 192 a mile, 24 miles ... ..                                                              | 4,608    |
| Plantations ... ..                                                                                   | 768      |
| Roads and fences ... ..                                                                              | 3,600    |
| Excavation ... ..                                                                                    | 49,363   |
| 1 Escape head, 30 feet water-way ... ..                                                              | 4,000    |
| 1 Fall at escape tail, 25 feet water-way ... ..                                                      | 5,500    |
| 6 Bridges, Class VII., one with regulator ... ..                                                     | 38,400   |
| 12 Three feet culverts in approaches to bridges ... ..                                               | 2,400    |
| 2 Locks of $60 \times 10$ at Rs. 6,500 each { Irrigation                                             | 11,000   |
| Navigation                                                                                           | 2,000    |
| 2 Mills, single house, at Rs. 1,300 ... ..                                                           | 2,600    |
| 74 Miles of Distributary, at Rs. 1,300 per mile, for 111 square miles of area to be irrigated ... .. | 96,200   |
|                                                                                                      | <hr/>    |
| Carried over ... ..                                                                                  | 2,20,439 |

## GENERAL ESTIMATE.

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|                                                                              |                 |                |
|------------------------------------------------------------------------------|-----------------|----------------|
|                                                                              | Brought forward | 2,20,439       |
| 2 First Class and 2 Second Class Chokees, one Assistant Engineer's residence | ..              | 10,850         |
|                                                                              |                 | <hr/> 2 31,289 |
| Establishment at 12½ per cent.                                               |                 | 28,911         |
|                                                                              |                 | <hr/> 2,60,200 |
| Add 30 per cent as before                                                    |                 | 69,387         |
|                                                                              |                 | <hr/> Total    |
|                                                                              |                 | 3,29,587       |

*Ranepoor Branch, lower part (K)*

Length 13½ miles, including tail escape, width at bottom 12½ feet, depth of water 2½ feet; fall per mile 2 feet, discharge 106 cubic feet per second.

|                                                                                   |                |
|-----------------------------------------------------------------------------------|----------------|
|                                                                                   | Rs             |
| Land, 13½ miles at Rs 192                                                         | .. 2,592       |
| Plantations                                                                       | .. 432         |
| Roads and fences                                                                  | . 2 025        |
| Excavation . .                                                                    | 15,072         |
| 4 Bridges, Class VII, one with regulator . . .                                    | .. 26,400      |
| 6 Three feet culverts in approaches to bridges ..                                 | 1,200          |
| 95 Miles of Distributary, at Rs 1,300 per mile for 141 square miles of irrigation | ... 1,23,500   |
| 1 First and 1 Second Class Chokey . . .                                           | .. 2,800       |
|                                                                                   | <hr/> 1,74,021 |
| Establishment at 12½ per cent                                                     | 21,752         |
|                                                                                   | <hr/> 1,95,773 |
| Add 30 per cent as before                                                         | 52,206         |
|                                                                                   | <hr/> Total    |
|                                                                                   | 2,47,979       |

*Sasseram Branch, upper part (L) .*

Length 7½ miles, with ½ mile escape, width at bottom 49 feet, depth of water 6 feet, fall per mile 1 foot, discharge 1,091 cubic feet per second.

|                                              |                    |
|----------------------------------------------|--------------------|
|                                              | Rs.                |
| Land, 8 miles at Rs. 422                     | .. 3,376           |
| Ditto for Executive Engineer's Head Quarters | ... 192            |
| Ditto for one Lock Channel                   | . 1,152            |
|                                              | <hr/> 4,720        |
| Plantations                                  | ... 766            |
| Roads and fences at Rs. 400                  | . 3,200            |
| Excavation                                   | ... 1,21,956       |
|                                              | <hr/> Carried over |
|                                              | 1,30,662           |

|                                                                                                             |                     |          |
|-------------------------------------------------------------------------------------------------------------|---------------------|----------|
|                                                                                                             | Brought forward ... | 1,30,662 |
| Inlet and Escape head, 9 openings ...                                                                       | ...                 | 20,500   |
| Minor drainage works ...                                                                                    | ...                 | 27,000   |
| Passage of the River Kao ...                                                                                | ...                 | 3,20,000 |
| Diversion of the Grand Trunk Road ...                                                                       | ...                 | 17,000   |
| 2 Bridges, Class II., one with regulator ...                                                                | ...                 | 37,000   |
| 4 Four feet culverts in approaches to bridges ...                                                           | ...                 | 1,880    |
| 1 Fall with barrier bridge, double { Irrigation                                                             | ...                 | 35,000   |
| locks, and lock channel ... { Navigation                                                                    | ...                 | 42,300   |
| 20 Miles of Distributary, Rs. 1,300 per mile ...                                                            | ...                 | 26,000   |
| 1 First Class and 1 Second Class Chokey, accommodation for Executive Engineer and Office, and work-shops... | ...                 | 33,800   |
|                                                                                                             |                     | <hr/>    |
|                                                                                                             |                     | 6,91,142 |
| Establishment at 12½ per cent. ...                                                                          | ...                 | 86,393   |
|                                                                                                             |                     | <hr/>    |
|                                                                                                             |                     | 7,77,535 |
| 30 per cent. added as before ...                                                                            | ...                 | 2,07,342 |
|                                                                                                             |                     | <hr/>    |
|                                                                                                             |                     | 9,84,877 |
|                                                                                                             |                     | <hr/>    |

*Sasseram Branch, second part (M).*

Length 22 miles, with one mile of escape; width at bottom 20 feet; depth of water 3½ feet; fall per mile 1·64 feet; discharge 288 cubic feet per second.

|                                                                                          |          |
|------------------------------------------------------------------------------------------|----------|
|                                                                                          | Rs.      |
| Land, 23 miles at Rs. 231 ...                                                            | 5,313    |
| Plantations ...                                                                          | 885      |
| Roads and Fences, at Rs. 250 ...                                                         | 5,750    |
| Excavation ...                                                                           | 63,606   |
| 3 Inlets, 10 feet with drop ...                                                          | 12,000   |
| 2 Bridges, Class VI., one including regulator...                                         | 18,600   |
| 4 Four feet culverts in approaches to bridges...                                         | 1,880    |
| 1 Escape head, 30 feet water-way ...                                                     | 5,000    |
| 3 Falls, at tail of escape, 30 feet water-way ...                                        | 22,500   |
| 4 Single locks 120 × 16 with single waste weirs { Irrigation                             | 30,000   |
| { Navigation                                                                             | 80,000   |
| 2 Small locks 60 × 10, with two 12 feet waste weirs { Irrigation                         | 15,000   |
| at Rs. 9,000 ... { Navigation                                                            | 3,000    |
| 4 Mills (double) at Rs. 2,200 each ...                                                   | 8,800    |
| 2 Ditto single at Rs. 1,300 ...                                                          | 2,600    |
| 60 Miles of Distributary, at Rs. 1,300 per mile for 88 miles of area to be irrigated ... | 78,000   |
|                                                                                          | <hr/>    |
| Carried over ...                                                                         | 3,52,934 |

|                                                                                        | Rs             |
|----------------------------------------------------------------------------------------|----------------|
| Brought forward                                                                        | 3 52 934       |
| 1 First and 5 Second Class Chokees, 1 Assistant Engineer's and 2 Overseers' residences | 16 500         |
|                                                                                        | <hr/> 3 69 435 |
| Establishment at 12½ per cent                                                          | 46 179         |
|                                                                                        | <hr/> 4,15 614 |
| 30 per cent added as before                                                            | 1,10 830       |
|                                                                                        | <hr/> Total    |
|                                                                                        | <hr/> 5 26 443 |

*Sasseram Branch, last part (N)*

Length 18½ miles, including tail escape, width at bottom 10½ feet, depth of water 2½ feet, fall per mile 2 feet, discharge 72 cubic feet per second.

|                                                                                             | Rs             |
|---------------------------------------------------------------------------------------------|----------------|
| Land, 18½ miles, at Rs 166 per mile                                                         | 3 071          |
| Plantations                                                                                 | 612            |
| Roads and Fences, at Rs 150                                                                 | 2 775          |
| Excavation                                                                                  | 18 461         |
| 1 Fall at tail 20 feet water way                                                            | 4 000          |
| 4 Bridges, Class VIII, one with regulator                                                   | 9,767          |
| 8 Three feet culverts in approaches to bridges                                              | 1 600          |
| 2 Locks 60 × 10, at Rs 6 500 { Irrigation                                                   | 8 000          |
| { Navigation                                                                                | 5 000          |
| 2 Single Mills, at Rs 1 300                                                                 | 2,600          |
| 6½ Miles of Distributary, at Rs 1,300 per mile, for 95 square miles of area to be irrigated | 83 200         |
| 1 First and 2 Second Class Chokees                                                          | 2 800          |
|                                                                                             | <hr/> 1,41 786 |
| Establishment at 12½ per cent                                                               | 17,723         |
|                                                                                             | <hr/> 1 59 509 |
| Add 30 per cent as before                                                                   | 42 535         |
|                                                                                             | <hr/> Total    |
|                                                                                             | <hr/> 2 02 044 |

*Jugjeewun Branch, first part (O)*

Length 17½ miles, with 2 miles of escape, width at bottom 14 feet, depth of water 2½ feet, fall per mile 2 feet, discharge 122 cubic feet per second.

|                              | Rs.                |
|------------------------------|--------------------|
| Land, 19½ miles at Rs 192    | 3,744              |
| Plantations                  | 624                |
| Roads and Fences, at Rs. 150 | 2,935              |
|                              | <hr/> Carried over |
|                              | <hr/> 7,293        |



APPENDIX B.—DETAILED ESTIMATE OF 1861.

|                                                                                                             |                     |                |
|-------------------------------------------------------------------------------------------------------------|---------------------|----------------|
|                                                                                                             | Brought forward ... | 1,30,662       |
| Inlet and Escape head, 9 openings ...                                                                       | ...                 | 20,500         |
| Minor drainage works ...                                                                                    | ...                 | 27,000         |
| Passage of the River Kao ...                                                                                | ...                 | 3,20,000       |
| Diversion of the Grand Trunk Road ...                                                                       | ...                 | 17,000         |
| 2 Bridges, Class II., one with regulator ...                                                                | ...                 | 37,000         |
| 4 Four feet culverts in approaches to bridges ...                                                           | ...                 | 1,880          |
| 1 Fall with barrier bridge, double { Irrigation                                                             | ...                 | 35,000         |
| locks, and lock channel ... { Navigation                                                                    | ...                 | 42,300         |
| 20 Miles of Distributary, Rs. 1,300 per mile ...                                                            | ...                 | 26,000         |
| 1 First Class and 1 Second Class Chocee, accommodation for Executive Engineer and Office, and work-shops... | ...                 | 33,800         |
|                                                                                                             |                     | <hr/> 6,91,142 |
| Establishment at 12½ per cent. ...                                                                          | ...                 | 86,393         |
|                                                                                                             |                     | <hr/> 7,77,535 |
| 30 per cent. added as before ...                                                                            | ...                 | 2,07,342       |
|                                                                                                             |                     | <hr/> 9,84,877 |

*Sasseram Branch, second part (M).*

Length 22 miles, with one mile of escape; width at bottom 20 feet; depth of water 3½ feet; fall per mile 1'6½ feet; discharge 288 cubic feet per second.

|                                                                                          |          |
|------------------------------------------------------------------------------------------|----------|
|                                                                                          | Rs.      |
| Land, 23 miles at Rs. 231 ...                                                            | 5,313    |
| Plantations ...                                                                          | 885      |
| Roads and Fences, at Rs. 250 ...                                                         | 5,750    |
| Excavation ...                                                                           | 63,606   |
| 3 Inlets, 10 feet with drop ...                                                          | 12,000   |
| 2 Bridges, Class VI., one including regulator...                                         | 18,600   |
| 4 Four feet culverts in approaches to bridges...                                         | 1,880    |
| 1 Escape head, 30 feet water-way ...                                                     | 5,000    |
| 3 Falls, at tail of escape, 30 feet water-way ...                                        | 22,500   |
| 4 Single locks 120 × 16 with single waste weirs { Irrigation                             | 30,000   |
| { Navigation                                                                             | 80,000   |
| 2 Small locks 60 × 10, with two 12 feet waste weirs { Irrigation                         | 15,000   |
| at Rs. 9,000 ... { Navigation                                                            | 3,000    |
| 4 Mills (double) at Rs. 2,200 each ...                                                   | 8,800    |
| 2 Ditto single at Rs. 1,300 ...                                                          | 2,600    |
| 60 Miles of Distributary, at Rs. 1,300 per mile for 88 miles of area to be irrigated ... | 78,000   |
|                                                                                          | <hr/>    |
| Carried over ...                                                                         | 3,52,934 |

## GENERAL ESTIMATE

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|                                                                                      | Rs                   |
|--------------------------------------------------------------------------------------|----------------------|
| Brought forward                                                                      | 3 52 934             |
| 1 First and 5 Second Class Chokees 1 Assistant Engineer's and 2 Overseers residences | 16 500               |
|                                                                                      | <hr/> 3 69 435       |
| Establishment at 12½ per cent                                                        | 46 179               |
|                                                                                      | <hr/> 4 15 614       |
| 30 per cent added as before                                                          | 1 10 830             |
|                                                                                      | <hr/> 5 26 443       |
| Total                                                                                | <hr/> <hr/> 5 26 443 |

*Sasseram Branch, last part (N)*

Length 18½ miles, including tail escape width at bottom 10½ feet depth of water 2½ feet fall per mile 2 feet, discharge 72 cubic feet per second.

|                                                                                           | Rs                   |
|-------------------------------------------------------------------------------------------|----------------------|
| Land 18½ miles, at Rs 166 per mile                                                        | 3 071                |
| Plantations                                                                               | 512                  |
| Roads and Fences, at Rs 150                                                               | 2 775                |
| Excavat on                                                                                | 18 401               |
| 1 Fall at tail, 20 feet water way                                                         | 4 000                |
| 4 Bridges Class VIII. one with regulator                                                  | 9 787                |
| 6 Three feet culverts in approaches to bridges                                            | 1 600                |
| 2 Locks 60×10 at Rs 6 500 { Irrigation                                                    | 8 000                |
| { Navigation                                                                              | 5 000                |
| 2 Single Mills at Rs 1 300                                                                | 2 600                |
| 64 Miles of Distr butary at Rs 1 300 per mile for 95 square miles of area to be irrigated | 83 200               |
| 1 First and 2 Second Class Chokees                                                        | 2 800                |
|                                                                                           | <hr/> 1 41 786       |
| Establishment at 12½ per cent                                                             | 17,723               |
|                                                                                           | <hr/> 1 59 509       |
| Add 30 per cent as before                                                                 | 42 535               |
|                                                                                           | <hr/> 2 02 044       |
| Total                                                                                     | <hr/> <hr/> 2 02 044 |

*Juggeewun Branch, first part (O)*

Length 17½ miles with 2 miles of escape, width at bottom 14 feet, depth of water 2½ feet, fall per mile 2 feet, discharge 122 cubic feet per second.

|                              | Rs    |
|------------------------------|-------|
| Land, 19½ miles at Rs 192    | 3 744 |
| Plantations                  | 624   |
| Roads and Fences, at Rs. 150 | 2 925 |
|                              | <hr/> |
| Carried over                 | 7,293 |

|                                                                                              |     |            |                 |     | Rs.            |
|----------------------------------------------------------------------------------------------|-----|------------|-----------------|-----|----------------|
|                                                                                              |     |            | Brought forward | ... | 7,293          |
| Excavation ...                                                                               | ... | ...        | ...             | ... | 37,080         |
| Escape head, 30 feet water-way                                                               | ... | ...        | ...             | ... | 4,000          |
| Fall at tail, 25 ditto                                                                       | ... | ...        | ...             | ... | 5,500          |
| 2 Bridges, Class VII., one with regulator                                                    | ... | ...        | ...             | ... | 14,400         |
| 4 Three feet culverts in approaches to bridges                                               | ... | ...        | ...             | ... | 800            |
| 5 Locks 60 × 10, at Rs. 6,500                                                                | {   | Irrigation | ...             | ... | 27,500         |
|                                                                                              |     | Navigation | ...             | ... | 5,000          |
| 5 Single Mills, at Rs. 1,300                                                                 | ... | ...        | ...             | ... | 6,500          |
| 54 Miles of Distributary, at Rs. 1,300 per mile, for 81 square miles of area to be irrigated | ... | ...        | ...             | ... | 70,200         |
| 1 First and 1 Second Class Chokee                                                            | ... | ...        | ...             | ... | 2,800          |
|                                                                                              |     |            |                 |     | <hr/> 1,81,070 |
| Establishment at 12½ per cent.                                                               | ... | ...        | ...             | ... | 22,634         |
|                                                                                              |     |            |                 |     | <hr/> 2,03,704 |
| Add 30 per cent. as before                                                                   | ... | ...        | ...             | ... | 54,321         |
|                                                                                              |     |            |                 |     | <hr/>          |
|                                                                                              |     |            | Total           | ... | 2,58,025       |

*Jugjeewun Branch, second part (P).*

Length 15 miles, including tail escape; width at bottom 9½ feet; depth of water 2½ feet; fall per mile 2 feet; discharge 61 cubic feet per second.

|                                                                                                                                            |     |     |       |     | Rs.            |
|--------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------|-----|----------------|
| Land, 15 miles at Rs. 166                                                                                                                  | ... | ... | ...   | ... | 2,490          |
| Plantations ...                                                                                                                            | ... | ... | ...   | ... | 415            |
| Roads and Fences, at Rs. 150                                                                                                               | ... | ... | ...   | ... | 2,250          |
| Excavation ...                                                                                                                             | ... | ... | ...   | ... | 14,134         |
| 3 Falls, one at tail, 115 feet water-way                                                                                                   | ... | ... | ...   | ... | 9,000          |
| 2 Bridges (one with regulator), Class IX.                                                                                                  | ... | ... | 3,765 | ... |                |
| 4 Three feet culverts in approaches to bridges                                                                                             | ... | ... | 800   | ... |                |
| 2 Metalled Fords, at Rs. 150 each                                                                                                          | ... | ... | 300   | ... |                |
|                                                                                                                                            |     |     |       |     | <hr/> 4,865    |
| 2 Single Mills, at Rs. 1,300 each                                                                                                          | ... | ... | ...   | ... | 2,600          |
| 40 Miles of Distributary, at Rs. 1,300 per mile for 82 square miles of area to be irrigated in addition to the Canal which will be so used | ... | ... | ...   | ... | 52,000         |
| Modules to be supplied to 15 miles of canal, at Rs. 400 per mile                                                                           | ... | ... | ...   | ... | 6,000          |
| 1 First and 1 Second Class Chokee, and 1 Overseer's residence                                                                              | ... | ... | ...   | ... | 5,425          |
|                                                                                                                                            |     |     |       |     | <hr/> 93,757   |
| Establishment at 12½ per cent.                                                                                                             | ... | ... | ...   | ... | 11,719         |
|                                                                                                                                            |     |     |       |     | <hr/> 1,05,476 |
| Add 30 per cent. as before                                                                                                                 | ... | ... | ...   | ... | 28,127         |
|                                                                                                                                            |     |     |       |     | <hr/>          |
|                                                                                                                                            |     |     | Total | ... | 1,33,603       |

*Buxar Branch, first part (Q)*

Length 8 miles, with 7 miles escape, width at bottom 37 feet, depth of water  $4\frac{1}{2}$  feet, fall per mile 1 18 feet, discharge 669 cubic feet per second

|                                                                      | Rs.      |
|----------------------------------------------------------------------|----------|
| Land 15 miles at Rs 422                                              | 6 330    |
| Ditto for 4 lock channels at Rs 1,152 each                           | 4 608    |
|                                                                      | <hr/>    |
|                                                                      | 10 908   |
| Plantations                                                          | 1 623    |
| Roads and Fences, at Rs 250                                          | 3,750    |
| Excavation                                                           | 91 490   |
| Escape head, 50 feet water way                                       | 11 000   |
| 1 Fall at escape tail 50 feet water way                              | 15 500   |
| 3 Bridges, one with regulator, Class IV                              | 33 370   |
| 6 Four feet culverts in approaches to bridges                        | 2 820    |
| 4 Falls with double locks, &c { Irrigation                           | 80 000   |
| { Navigation                                                         | 1 77 000 |
| 4 Mills (double) at Rs 2 200 each                                    | 8 800    |
| 28 Miles of Distributary, at Rs 1 300 per mile, for 12 square miles  | 38 400   |
| 1 First Class and 4 Second Class Chokees, and 1 Overseer's residence | 7,825    |
|                                                                      | <hr/>    |
|                                                                      | 4 84 116 |
| Establishment at 12½ per cent as before                              | 60 514   |
|                                                                      | <hr/>    |
|                                                                      | 5 44 630 |
| Add 30 per cent. as before                                           | 1 15 235 |
|                                                                      | <hr/>    |
| Total                                                                | 6 80 865 |
|                                                                      | <hr/>    |

*Buxar Branch, second part (R)*

Length 11 miles with 4 miles of escape width at bottom 18½ feet, depth of water  $3\frac{1}{2}$  feet, fall per mile  $1\frac{1}{2}$  feet, discharge 243 cubic feet per second

|                                                                         | Rs       |
|-------------------------------------------------------------------------|----------|
| Land, 15 miles at Rs 231                                                | 3 465    |
| Plantations                                                             | 577      |
| Roads and Fences, at Rs 250                                             | 3,750    |
| Excavation                                                              | 40,581   |
| Escape head, 30 feet water way                                          | 5,000    |
| Fall in tail of escape, 30 feet water way                               | 7,500    |
| 3 Bridges, Class VI (one on escape), one with regulator                 | 26 600   |
| 6 Four feet culverts in approaches to bridges                           | 2 820    |
| 2 Locks 60 x 10, with double 10 feet waste weirs, Rs 8 000 { Irrigation | 15 000   |
| { Navigation                                                            | 1 000    |
| 2 Mills (single), at Rs 1,300 each                                      | 2,600    |
|                                                                         | <hr/>    |
| Carried over                                                            | 1 03 893 |

|                                                                                                  |                 |     |     | Rs.      |
|--------------------------------------------------------------------------------------------------|-----------------|-----|-----|----------|
|                                                                                                  | Brought forward | ... | ... | 1,08,893 |
| 48 Miles of Distributary, at Rs. 1,300 per mile, for $73\frac{1}{2}$ square miles of irrigation  | ...             | ... | ... | 62,400   |
| 1 First Class and one Second Class Chokee, one Assistant Engineer's and one Overseer's residence | ...             | ... | ... | 10,675   |
|                                                                                                  |                 |     |     | 1,81,968 |
| Establishment at $12\frac{1}{2}$ per cent.                                                       | ...             | ... | ... | 22,746   |
|                                                                                                  |                 |     |     | 2,04,714 |
| Add 30 per cent. as before                                                                       | ...             | ... | ... | 54,590   |
| Total                                                                                            | ...             | ... | ... | 2,59,304 |

*Buxar Branch, third part (S).*

Length  $11\frac{1}{2}$  miles, with  $1\frac{1}{2}$  miles of escape; width at bottom  $14\frac{1}{2}$  feet; depth of water  $2\frac{1}{2}$  feet; fall per mile 2 feet; discharge 140 cubic feet per second.

|                                                                                    |              |     |     | Rs.      |
|------------------------------------------------------------------------------------|--------------|-----|-----|----------|
| Land, 13 miles at Rs. 192                                                          | ...          | ... | ... | 2,496    |
| Plantations                                                                        | ...          | ... | ... | 416      |
| Roads and Fences, at Rs. 150                                                       | ...          | ... | ... | 1,950    |
| Excavation                                                                         | ...          | ... | ... | 25,225   |
| Escape head, 20 feet water-way                                                     | ...          | ... | ... | 3,250    |
| Fall in escape tail, 25 ditto                                                      | ...          | ... | ... | 5,500    |
| 2 Bridges, Class VII., one with regulator                                          | ...          | ... | ... | 14,400   |
| 4 Three feet culverts in approaches to bridges                                     | ...          | ... | ... | 800      |
| 2 Locks $60 \times 10$ , at Rs. 6,500                                              | { Irrigation | ... | ... | 11,000   |
|                                                                                    | { Navigation | ... | ... | 2,000    |
| 2 Single Mills, at Rs. 1,300                                                       | ...          | ... | ... | 2,600    |
| 37 Miles of Distributary, at Rs. 1,300 per mile, for 56 square miles of irrigation | ...          | ... | ... | 48,100   |
| 1 First and one Second Class Chokee, and one Overseer's residence                  | ...          | ... | ... | 5,425    |
|                                                                                    |              |     |     | 1,23,162 |
| Establishment at $12\frac{1}{2}$ per cent.                                         | ...          | ... | ... | 15,395   |
|                                                                                    |              |     |     | 1,38,557 |
| Add 30 per cent. as before                                                         | ...          | ... | ... | 36,949   |
| Total                                                                              | ...          | ... | ... | 1,75,506 |

*Buxar Branch, last part (T).*

Length 18 miles, including tail escapé; width at bottom  $10\frac{1}{2}$  feet; depth of water  $2\frac{1}{2}$  feet; fall per mile 2 feet; discharge 72 cubic feet per second.

|                              |     |     |     | Rs.   |
|------------------------------|-----|-----|-----|-------|
| Land, 18 miles at Rs. 166    | ... | ... | ... | 2,988 |
| Plantations                  | ... | ... | ... | 498   |
| Roads and Fences, at Rs. 150 | ... | ... | ... | 2,700 |
| Carried over                 | ... | ... | ... | 6,186 |

## GENERAL ESTIMATE.

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|                                                                         | Rs.            |
|-------------------------------------------------------------------------|----------------|
| Brought forward ...                                                     | 6,186          |
| Excavation ... ..                                                       | 17,962         |
| 3 Falls, 2 at tail, 20 feet water way...                                | 12,000         |
| 2 Bridges, Class VIII one with regulator ...                            | 5,167          |
| 4 Three feet culverts in approaches to bridges                          | 800            |
| 6 Metalled fords, at Rs. 150 each ..                                    | 900            |
|                                                                         | <hr/> 6,867    |
| 2 Single Mills (one at tail fall), at Rs 1,300 ..                       | 2,600          |
| 64 Miles of Distributary, at per mile Rs. 1,300, for 96 square miles .. | 83,200         |
| 1 First and one Second Class Chokes ..                                  | 2,800          |
|                                                                         | <hr/> 1,31,615 |
| Add Establishment at 12½ per cent                                       | 16,451         |
|                                                                         | <hr/> 1,48,066 |
| Add as before 30 per cent                                               | 39,434         |
|                                                                         | <hr/> 1,87,550 |

*Doomraon Branch (U)*

Length 13 miles, including tail escape, width at bottom 7 feet, depth of water way 1½ feet, fall per mile 2 feet, discharge 26 cubic feet per second

|                                                        | Rs.          |
|--------------------------------------------------------|--------------|
| Land, 13 miles at Rs 127½ ...                          | 1,657        |
| Plantations ..                                         | 276          |
| Roads and Fences, at Rs 150 ...                        | 1,950        |
| Excavation ..                                          | 7,495        |
| 2 Falls, one at tail, 10 feet water way ..             | 4,000        |
| 3 Bridges, Class IX, one with regulator ..             | 5,465        |
| 6 Three feet culverts in approaches to bridges ...     | 1,200        |
| 3 Metalled fords at Rs 120 ..                          | 360          |
|                                                        | <hr/> 7,025  |
| 2 Mills, one (at tail fall) Rs 1,300 each ... ..       | 2,600        |
| (No Distributary required)                             |              |
| 13 Miles of canal supplied with Modules, at Rs. 400 .. | 5,200        |
| 1 Second Class Chokee ... ..                           | 800          |
|                                                        | <hr/> 31,003 |
| Establishment at 12½ per cent ...                      | 3,875        |
|                                                        | <hr/> 34,878 |
| Add 30 per cent as before                              | 9,300        |
|                                                        | <hr/> 44,178 |
| Total                                                  | <hr/>        |

*Bareilly Branch (T).*

Length 13 miles, including tail escape; width 5½ feet; depth of water 2 feet  
fall per mile 2 feet; discharge 48 cubic feet per second.

|                                                     |     |     |     |     | Rs.   |
|-----------------------------------------------------|-----|-----|-----|-----|-------|
| Land, 13 miles at Rs. 127½ per mile                 | ..  | ... | ... | ... | 1,65  |
| Plantations                                         | ... | ... | ... | ... | 27    |
| Roads and Fences at Rs. 150                         | ... | ... | ... | ... | 1,95  |
| Excavation                                          | ... | ... | ... | ... | 11,71 |
| 3 Falls, 15 feet water-way, including tail fall at  | ... | ... | ... | ... | 9,50  |
| 2 Bridges, Class IX., one with regulator            | ... | ... | ... | ... | 3,76  |
| 4 Three feet culverts in approaches to bridges      | ... | ... | ... | ... | 80    |
| 3 Single Mills                                      | ... | ... | ... | ... | 3,90  |
| 30 Miles of Distributary Channel, at Rs. 1,300...   | ... | ... | ... | ... | 26,00 |
| 13 Miles of canal supplied with Modules, at Rs. 400 | ... | ... | ... | ... | 5,20  |
| 1 First and one Second Class Chokey                 | ... | ... | ... | ... | 2,80  |
|                                                     |     |     |     |     | 67,55 |
| Establishment at 12½ per cent.                      | ... | ... | ... | ... | 8,44  |
|                                                     |     |     |     |     | 76,00 |
| Add 30 per cent. as before                          | ... | ... | ... | ... | 20,26 |
| Total cost                                          | ... | ... | ... | Rs. | 96,27 |

*Chowra Branch, first Part (W).*

Length 6½ miles, with 7 miles of escape; width at bottom 26 feet; depth of  
water 4.1 feet; fall per mile 1.41 feet; discharge 395 cubic feet per second.

|                                                                                       |     |     |     |     | Rs.      |
|---------------------------------------------------------------------------------------|-----|-----|-----|-----|----------|
| Land, 13½ miles at Rs. 255                                                            | ... | ... | ... | ... | 3,412    |
| Plantations                                                                           | ... | ... | ... | ... | 573      |
| Roads and Fences, at Rs. 250                                                          | ... | ... | ... | ... | 3,375    |
| Excavation                                                                            | ... | ... | ... | ... | 56,855   |
| Escape head, 40 feet water-way                                                        | ... | ... | ... | ... | 7,750    |
| 1 Fall, 40 feet water-way, at tail of escape                                          | ... | ... | ... | ... | 11,500   |
| 2 Bridges, one with regulator                                                         | ... | ... | ... | ... | 20,900   |
| 4 Four feet culverts in approaches to bridges...                                      | ... | ... | ... | ... | 1,880    |
| 2 Locks (double) with double waste weirs                                              | ... | ... | ... | ... | 31,000   |
|                                                                                       | ... | ... | ... | ... | 59,800   |
| 2 Mills (double) at Rs. 2,200                                                         | ... | ... | ... | ... | 4,400    |
| 30 Miles of Distributary, at Rs. 1,300 per mile, for 44 square miles<br>of Irrigation | ... | ... | ... | ... | 39,000   |
| 1 First Class Chokey, and one Overseer's residence                                    | ... | ... | ... | ... | 5,200    |
|                                                                                       |     |     |     |     | 2,45,675 |
| Establishment at 12½ per cent.                                                        | ... | ... | ... | ... | 30,709   |
|                                                                                       |     |     |     |     | 2,76,384 |
| Add 30 per cent. as before                                                            | ... | ... | ... | ... | 73,702   |
| Total                                                                                 | ... | ... | ... | ... | 3,50,086 |

*Chowsea Branch second part (X)*

Length  $12\frac{1}{2}$  miles, with 2 miles of escape, width at bottom 21 feet, depth of water 3, feet, fall per mile 1 60 feet, discharge  $31\frac{1}{4}$  cub c feet per second

|                                                                                 | Rs       |
|---------------------------------------------------------------------------------|----------|
| Land $14\frac{1}{2}$ miles at Rs 231                                            | 3 349    |
| Plantations                                                                     | 558      |
| Roads and Fences at Rs 250                                                      | 3 625    |
| Excavat on                                                                      | 35 451   |
| Escape head, 30 feet                                                            | 5 000    |
| Tail fall for escape 30 feet                                                    | 7 500    |
| 2 Bridges Class VI one with regulator                                           | 17 600   |
| 4 Four feet culverts in approaches to bridges                                   | 1 880    |
| 3 Locks single with single waste channel { Irrigation                           | 22 500   |
| { Navigation                                                                    | 60 000   |
| 3 Mills double at Rs 2 200                                                      | 6 600    |
| 54 Miles of Distributary at Rs 1 300 per mile for 80 square miles of irrigation | 70 200   |
| 1 First and one Second Class Chokey and one Overseer's residence                | 5 425    |
|                                                                                 | <hr/>    |
|                                                                                 | 2 39 688 |
| Establishment at $12\frac{1}{2}$ per cent                                       | 29 961   |
|                                                                                 | <hr/>    |
|                                                                                 | 2 69 649 |
| Add 30 per cent as before                                                       | 71 906   |
|                                                                                 | <hr/>    |
| Total                                                                           | 3 41 555 |
|                                                                                 | <hr/>    |

*Clowsea Branch last part (Y)*

Length 15 miles including tail escape width at bottom  $18\frac{1}{4}$  feet depth of water  $3\frac{1}{2}$  feet, fall per mile 1 72 feet discharge  $25\frac{1}{4}$  cubic feet per second.

|                                                                                              | Rs       |
|----------------------------------------------------------------------------------------------|----------|
| Land, at Rs 231 per mile for 15 miles                                                        | 3 465    |
| Plantations                                                                                  | 677      |
| Roads and fences at Rs 200                                                                   | 3 750    |
| Excavation                                                                                   | 27 443   |
| 3 Bridges Class VI one with Regulator                                                        | 26 600   |
| 6 Four feet culverts in approaches to bridges                                                | 2 820    |
| 2 Locks with single chamber and waste { Irrigation                                           | 11 000   |
| weirs { Navigation                                                                           | 43 000   |
| Terminal works for descent into Kurumnassa                                                   | 2 50 000 |
|                                                                                              | <hr/>    |
|                                                                                              | 2 93 000 |
| 4 Mills at Rs. 2 200 each                                                                    | 8 800    |
| 92 Miles of Distributary at Rs. 1 300 per mile, for 138 square miles of area to be irrigated | 1 19 600 |
|                                                                                              | <hr/>    |
| Carried over                                                                                 | 4 97 000 |



*Patna Branch, second part (c).*

Length 14 miles, with escape  $\frac{1}{2}$  a mile; width at bottom  $34\frac{1}{2}$  feet; depth of water  $4\frac{7}{8}$  feet; fall per mile 1.18 feet; discharge 659 cubic feet per second.

|                                                                                                                      | Rs.                               |
|----------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Land, $14\frac{1}{2}$ miles, Rs. 282 per mile                                                                        | 4,089                             |
| Plantations ... ..                                                                                                   | 681                               |
| Roads and fences, at Rs. 250 ... ..                                                                                  | 3,625                             |
| Excavation ... ..                                                                                                    | 58,618                            |
| Escape head, 40 feet water-way ... ..                                                                                | 7,750                             |
| 2 Falls on escape, 50 feet water-way ... ..                                                                          | 31,000                            |
| 2 Bridges, Class IV. (one with Regulator) ... ..                                                                     | 23,370                            |
| 4 Four feet culverts in approaches ... ..                                                                            | 1,880                             |
| 3 Falls with locks (double), with double waste weirs { Irrigation<br>and channels, at Rs. 64,400 ... .. { Navigation | 60,000<br>1,33,200                |
| 3 Sets of double Mills, at Rs. 2,200 ... ..                                                                          | 6,600                             |
| 50 Miles of distributaries, at Rs. 1,300 per mile, for 74 square miles<br>of irrigation ... ..                       | 65,000                            |
| 1 First Class and 3 Second Class Chokees, and 2 Overseer's residences                                                | 10,450                            |
|                                                                                                                      | <hr/> 4,06,263                    |
| Establishment at $12\frac{1}{2}$ per cent.... ..                                                                     | 50,783                            |
|                                                                                                                      | <hr/> 4,57,046                    |
| Add 30 per cent. as above ... ..                                                                                     | 1,21,878                          |
|                                                                                                                      | <hr/> Total cost ... Rs. 5,78,924 |

*Patna Branch, third part (d).*

Length  $26\frac{1}{2}$  miles, with  $\frac{3}{4}$  mile of escape; width at bottom  $29\frac{1}{2}$  feet; depth of water  $4\frac{1}{2}$  feet; fall per mile  $1\frac{1}{2}$  feet; discharge 424 cubic feet per second.

|                                                                                              | Rs.                             |
|----------------------------------------------------------------------------------------------|---------------------------------|
| Land, $27\frac{1}{2}$ miles, at Rs. 282 per mile                                             | 7,755                           |
| Plantations .. ..                                                                            | 1,292                           |
| Roads and fences, at Rs. 250 ... ..                                                          | 6,875                           |
| Excavation ... ..                                                                            | 95,851                          |
| Escape head, 40 feet water-way ... ..                                                        | 7,750                           |
| 3 Falls on escape, 40 feet water-way ... ..                                                  | 34,500                          |
| 5 Bridges, Class IV. (one with Regulator) ... ..                                             | 53,370                          |
| 10 Four feet culverts in approaches ... ..                                                   | 4,700                           |
| 4 Double locks with double waste { Irrigation<br>channels ... .. { Navigation                | 62,000<br>1,19,600              |
| 4 Double Mills, at Rs. 2,200... ..                                                           | 8,800                           |
| 96 Miles of distributary, at Rs. 1,300 per mile for 144 square miles of<br>irrigation ... .. | 1,24,800                        |
|                                                                                              | <hr/> Carried over ... 5,26,293 |

## GENERAL ESTIMATE.

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|                                                                                          |                 |         | Rs.      |
|------------------------------------------------------------------------------------------|-----------------|---------|----------|
|                                                                                          | Brought forward | ...     | 5,26,293 |
| 2 First and 4 Second Class Chokees, 1 Assistant Engineer, and<br>2 Overseers' residences | ...             | ...     | 17,700   |
|                                                                                          |                 |         | 5,43,993 |
| Establishment at 12½ per cent.                                                           | ...             | ...     | 67,999   |
|                                                                                          |                 |         | 6,11,992 |
| Add 30 per cent. as before                                                               | ...             | ...     | 1,63,197 |
|                                                                                          |                 |         |          |
|                                                                                          | Total cost      | ... Rs. | 7,75,180 |

*Patna Branch, fourth part (e).*

Length 9½ miles, with ½ mile of escape; width at bottom 26 feet; depth of water 4 feet; fall per mile 1'4 feet; discharge 391 cubic feet per second.

|                                                                                         |            |         |     | Rs.      |
|-----------------------------------------------------------------------------------------|------------|---------|-----|----------|
| Land, 11½ miles, at Rs. 255 per mile                                                    | ...        | ...     | ... | 2,932    |
| Plantations                                                                             | ...        | ...     | ... | 488      |
| Roads and fences, at Rs. 250                                                            | ...        | ...     | ..  | 2,875    |
| Excavation                                                                              | ...        | ...     | ... | 29,256   |
| Escape head, 30 feet water-way                                                          | ...        | ...     | ... | 6,500    |
| 3 Falls on escape, 40 feet water-way                                                    | ..         | ...     | ..  | 34,500   |
| 2 Bridges (Class V), one with Regulator...                                              | ...        | ...     | ... | 20,915   |
| 4 Four feet culverts in approaches                                                      | ...        | ...     | ... | 1,880    |
| 2 Locks with double chambers and { Irrigation<br>waste weirs .. { Navigation            | ...        | ...     | ... | 31,000   |
| 2 Sets of double mills, at Rs. 2,200                                                    | ...        | ...     | ... | 58,200   |
| 2 Sets of double mills, at Rs. 2,200                                                    | ...        | ...     | ... | 4,400    |
| 30 Miles of distributaries, at Rs. 1,200 per mile, for 45 square<br>miles of irrigation | ...        | ...     | ... | 39,000   |
| 1 First Class and 1 Second Class Chokee and 1 Overseer's residence                      |            |         |     | 5,425    |
|                                                                                         |            |         |     | 2,37,381 |
| Establishment at 12½ per cent.,                                                         | ...        | ...     | ... | 29,672   |
|                                                                                         |            |         |     | 2,67,053 |
| Add 30 per cent. as before                                                              | ...        | ...     | ... | 71,214   |
|                                                                                         |            |         |     |          |
|                                                                                         | Total cost | ... Rs. |     | 3,38,267 |

*Patna Branch, last part (f).*

Length 27 miles to terminus on Ganges; width at bottom 18 feet; depth of water 3½ feet; fall per mile 1'78 feet; discharge 234 cubic feet per second.

|                                     |              |     |     | Rs.   |
|-------------------------------------|--------------|-----|-----|-------|
| Land, 27 miles, at Rs. 231 per mile | ..           | ... | ... | 6,237 |
| Plantations                         | ...          | ... | ... | 1,039 |
|                                     |              |     |     |       |
|                                     | Carried over | ... |     | 7,276 |

|                                                     |                 |     |     | Rs.      |
|-----------------------------------------------------|-----------------|-----|-----|----------|
|                                                     | Brought forward | ... |     | 69,979   |
| 14 Miles of canal supplied with modules, at Rs. 400 |                 |     |     |          |
| per mile                                            | ...             | ... | ... | 5,600    |
| 1 First and 1 Second Class Chokee                   | ...             | ... | ... | 2,800    |
|                                                     |                 |     |     | <hr/>    |
|                                                     |                 |     |     | 78,379   |
| Establishment at 12½ per cent.                      | ...             | ... | ... | 9,797    |
|                                                     |                 |     |     | <hr/>    |
|                                                     |                 |     |     | 88,176   |
| Add 30 per cent. as before                          | ...             | ... | ... | 23,513   |
|                                                     |                 |     |     | <hr/>    |
|                                                     | Total cost      | ... | Rs. | 1,11,689 |

*Dinapoor Branch (j).*

Length 20 miles, width at bottom 14 feet; depth of water 2¼ feet; fall per mile 2 feet; discharge 124 cubic feet per second.

|                                                                                     |            |     |     | Rs. | Rs.      |
|-------------------------------------------------------------------------------------|------------|-----|-----|-----|----------|
| Land, 20 miles at Rs. 192 per mile                                                  | ...        | ... | ... |     | 3,840    |
| Plantations                                                                         | ...        | ... | ... | ... | 640      |
| Roads and fences                                                                    | ...        | ... | ... | ... | 3,000    |
| Excavation                                                                          | ...        | ... | ... | ... | 38,033   |
| 3 Falls at tail, of 25 feet water-way                                               | ...        | ... | ... | ... | 16,500   |
| 8 Bridges, Class VII., (see remark to last part of Patna Branch) one with Regulator | ...        | ... | ... | ... | 50,400   |
| 16 Four feet culverts in approaches                                                 | ...        | ... | ... | ... | 7,520    |
| 2 Mills, at Rs. 1,300                                                               | ...        | ... | ... | ... | 2,600    |
| 110 Miles of distributary at Rs. 1,300 per mile for 165 square miles of irrigation  | ...        | ... | ... | ... | 1,43,000 |
| 1 First and 2 Second Class Chokee, and 1 Overseer's residence                       | ...        | ... | ... | ... | 6,225    |
|                                                                                     |            |     |     |     | <hr/>    |
|                                                                                     |            |     |     |     | 2,71,758 |
| Establishment at 12½ per cent.                                                      | ...        | ... | ... | ... | 33,970   |
|                                                                                     |            |     |     |     | <hr/>    |
|                                                                                     |            |     |     |     | 3,05,728 |
| Add 30 per cent. as before                                                          | ...        | ... | ... | ... | 81,527   |
|                                                                                     |            |     |     |     | <hr/>    |
|                                                                                     | Total cost | ... | Rs. |     | 3,87,255 |

*Tikaree Branch, first part (k).*

Length 10 miles, with one mile of escape; width at bottom 26 feet; depth of water 4 feet; fall per mile 1.40 feet; discharge 400 cubic feet per second.

|                                                     |              |     | Rs.   |
|-----------------------------------------------------|--------------|-----|-------|
| Land, 11 miles, at Rs. 255 per mile                 | ...          | ... | 2,805 |
| Ditto Executive Engineer, Head Quarters, 32 beeghas | ...          | ... | 192   |
|                                                     |              |     | <hr/> |
|                                                     |              |     | 2,997 |
|                                                     |              |     | <hr/> |
|                                                     | Carried over | ... | 2,997 |

## GENERAL ESTIMATE.

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|                                                                                        | Ra.      | Ra.       |
|----------------------------------------------------------------------------------------|----------|-----------|
| Brought forward ..                                                                     | ...      | 2,997     |
| Plantations ... ..                                                                     | ...      | 499       |
| Roads and fences, at Rs. 250 ... ..                                                    | ...      | 2,750     |
| Excavation ... ..                                                                      | ...      | 62,508    |
| Passage of Poonpoom ... ..                                                             | 2,00,000 |           |
| Ditto of Bootana ... ..                                                                | 6,00,000 |           |
| Ditto of two small tributaries to Poonpoom ... ..                                      | 50,000   |           |
|                                                                                        |          | 8,50,000  |
| 2 Falls of 40 feet water-way for escape ... ..                                         | ...      | 23,000    |
| 3 Bridges, Class V., one with Regulator ... ..                                         | ...      | 29,915    |
| 6 Four feet culverts in approaches ... ..                                              | ...      | 2,820     |
| 20 Miles of distributary, at Rs. 1,300 per mile, for 30 miles of irrigated area ... .. | ...      | 26,000    |
| 1 First Class and 1 Second Class Chokey, and 3 Overseers' residences ... ..            | 11,275   |           |
| Executive Engineer's residence, with Office, 2 Clerks' residences and work-shop ... .. | 25,750   |           |
|                                                                                        |          | 37,025    |
|                                                                                        |          | 10,44,014 |
| Establishment at 12½ per cent. ... ..                                                  | ...      | 1,30,501  |
|                                                                                        |          | 11,74,515 |
| Add 30 per cent. as before ... ..                                                      | ...      | 3,13,205  |
| Total cost .. Ra.                                                                      |          | 14,87,720 |

*Tikares Branch, second part (i)*

Length 5 miles (no escape); width at bottom 23 feet; depth of water 3½ feet; fall per mile 1 51 feet; discharge 361 cubic feet per second.

|                                                                             | Ra.      |
|-----------------------------------------------------------------------------|----------|
| Land, 5 miles, at Rs. 255 per mile ... ..                                   | 1,275    |
| Plantations ... ..                                                          | 212      |
| Roads and fences, at Rs. 250 ... ..                                         | 1,250    |
| Excavation ... ..                                                           | 22,453   |
| Passage of the Uddree ... ..                                                | 90,000   |
| 2½ Bridges, Class V., one with Regulator and one on Grand Trunk Road ... .. | 29,415   |
| 4 Four feet culverts in approaches ... ..                                   | 1,880    |
| 6 Miles of distributary, at Rs. 1,300 ... ..                                | 7,800    |
| 1 Second Class Chokey, and 1 Overseer's residence ... ..                    | 3,425    |
|                                                                             | 1,57,710 |
| Establishment at 12½ per cent. ... ..                                       | 19,713   |
|                                                                             | 1,77,423 |
| Add 30 per cent. as before ... ..                                           | 47,313   |
| Total cost ... Ra.                                                          | 2,24,736 |

*Tikaree Branch, third part (n).*

Length 11 miles, escape 1 mile; width at bottom 20 feet; depth of water  $3\frac{1}{2}$  feet; discharge 287 cubic feet per second.

|                                                                                           |     |     |     | Rs.             |
|-------------------------------------------------------------------------------------------|-----|-----|-----|-----------------|
| Land, 12 miles, at Rs. 231 per mile                                                       | ... | ..  | ... | 2,772           |
| Plantations                                                                               | ... | ... | ... | 462             |
| Roads and fences, at Rs. 250                                                              | ... | ... | ... | 3,000           |
| Excavation                                                                                | ... | ... | ... | 34,062          |
| Passages of the Tikaree and Mudar                                                         | ... | ... | ... | 1,26,000        |
| Escape head 30 feet water-way                                                             | ... | ... | ... | 5,000           |
| 2 Falls, 30 feet water-way on escape                                                      | ... | ... | ... | 15,000          |
| 4 Bridges, Class VI., one with Regulator                                                  | ... | ... | ... | 34,620          |
| 8 Four feet culverts in approaches                                                        | ... | ... | ... | 3,760           |
| 12 Miles of distributary, at Rs. 1,300 per mile, for 18 square miles of irrigation        | ... | ... | ... | 15,700          |
| 1 First and 1 Second Class Chokey, and 1 Assistant Engineer's and 2 Overseers' residences | ... | ... | ... | 13,300          |
|                                                                                           |     |     |     | <hr/>           |
|                                                                                           |     |     |     | 2,53,676        |
| Establishment at $12\frac{1}{2}$ per cent.                                                | ... | ... | ... | 31,709          |
|                                                                                           |     |     |     | <hr/>           |
|                                                                                           |     |     |     | 2,85,385        |
| Add 30 per cent. as before                                                                | ... | ... | ... | 76,103          |
|                                                                                           |     |     |     | <hr/>           |
| Total cost                                                                                | ... | Rs. |     | <u>3,61,488</u> |

*Tikaree Branch, fourth part (n).*

Length 8 miles, (no escape; width at bottom  $18\frac{1}{2}$  feet; depth of water  $3\frac{1}{2}$  feet; fall per mile 1.74 feet; discharge 259 cubic feet per second.

|                                                  |     |     |     | Rs.             |
|--------------------------------------------------|-----|-----|-----|-----------------|
| Land, 8 miles, at Rs. 231 per mile               | ... | ... | ... | 1,848           |
| Plantations                                      | ..  | ... | ... | 308             |
| Roads and fences, at Rs. 250                     | ... | ... | ... | 2,000           |
| Excavation                                       | ... | ... | ... | 21,648          |
| Passage of the Dhawa                             | ... | ... | ... | 36,000          |
| 3 Bridges, Class VI., one with Regulator         | ... | ... | ... | 26,620          |
| 6 Four feet culverts in approaches               | ... | ... | ... | 2,820           |
| 10 Miles of distributary, at Rs. 1,300           | ... | ... | ... | 13,000          |
| 1 Second Class Chokey and 1 Overseer's residence | ... | ... | ... | 3,425           |
|                                                  |     |     |     | <hr/>           |
|                                                  |     |     |     | 1,07,664        |
| Establishment at $12\frac{1}{2}$ per cent.       | ... | ... | ... | 13,458          |
|                                                  |     |     |     | <hr/>           |
|                                                  |     |     |     | 1,21,122        |
| Add 30 per cent. as before                       | ... | ... | ... | 32,299          |
|                                                  |     |     |     | <hr/>           |
| Total cost                                       | ... | Rs. |     | <u>1,53,421</u> |

*Tikaree Branch fifth part (o)*

Length 5 miles (no escape) width at bottom 17 feet depth of water 3½ feet, fall per mile 1 8a feet discharge 219 cub c feet per second

|                                                                                  | Rs.          |
|----------------------------------------------------------------------------------|--------------|
| Land, 5 miles at Rs 231 per mile                                                 | 1 153        |
| Plantations                                                                      | 192          |
| Roads and fences at Rs 250                                                       | 1 200        |
| Excavation                                                                       | 10 672       |
| 2 Bridges Class VI (one with Regulator)                                          | 18 620       |
| 4 Four feet culverts in approaches                                               | 1 880        |
| 19 Miles of distributary at Rs 1 300 per mile for 27½ square miles of irrigation | 24 700       |
| 1 Second Class Chokey                                                            | 800          |
|                                                                                  | <hr/> 59 269 |
| Establishment at 12½ per cent                                                    | 7 408        |
|                                                                                  | <hr/> 66 677 |
| Add 30 per cent as before                                                        | 17 781       |
|                                                                                  | <hr/> 84 458 |
| Total cost                                                                       | Rs           |

*Tikaree Branch sixth part (p)*

Length 4 miles with 2 miles of escape width at bottom 14½ feet depth of water 2½ feet, fall per mile 2 feet, discharge 134 cub c feet per second

|                                                                                 | Rs     | Rs             |
|---------------------------------------------------------------------------------|--------|----------------|
| Land 6 miles at Rs 192 per mile                                                 |        | 1 152          |
| Plantations                                                                     |        | 192            |
| Roads and fences at Rs 150                                                      |        | 900            |
| Excavation                                                                      |        | 9 381          |
| Passage of the Neara River                                                      | 15 000 |                |
| Head of escape 20 feet water way                                                | 2 200  |                |
| 2 Falls for escape 20 feet water way                                            | 8 000  |                |
|                                                                                 | <hr/>  | 25 200         |
| 2 Bridges Class VII (one with Regulator)                                        |        | 14 410         |
| 4 Three feet culverts in approaches                                             |        | 800            |
| 10 Miles of distributary at Rs 1 300 per mile for 14 square miles of irrigation |        | 13 000         |
| 1 First Class Chokey 1 Assistant Engineer's residence                           |        | 7 250          |
|                                                                                 |        | <hr/> 72 280   |
| Establishment at 12½ per cent.                                                  |        | 9 030          |
|                                                                                 |        | <hr/> 81 320   |
| Add 30 per cent as before                                                       |        | 21 685         |
|                                                                                 |        | <hr/> 1 03 005 |
| Total cost                                                                      | Rs     |                |

*Tikaree Branch, last part (q).*

Length 2½ miles to tail escape; width at bottom 10 feet, depth of water 2½ feet; fall per mile 2 feet; discharge 64 cubic feet per second:—

|                                                                                                    |     |            |     | Rs.    | Rs.      |
|----------------------------------------------------------------------------------------------------|-----|------------|-----|--------|----------|
| Land, 24 miles, at Rs. 166 per mile                                                                | ... | ...        | ... | ...    | 3,984    |
| Plantations                                                                                        | ... | ...        | ... | ...    | 664      |
| Roads and fences, at Rs. 150                                                                       | ... | ...        | ... | ...    | 3,600    |
| Excavation                                                                                         | ... | ...        | ... | ...    | 30,337   |
| 4 Falls (2 at tail escape) 15 feet water-way                                                       | ... | ...        | ... | 12,000 |          |
| 4 Locks, at Rs. 6,500...                                                                           | {   | Irrigation | ... | 16,000 | 28,000   |
|                                                                                                    |     | Navigation | ... | 10,000 |          |
| 5 Sets of mills, at Rs. 1,300                                                                      | ... | ...        | ... | ...    | 6,500    |
| 2 Bridges, Class VIII. (one with Regulator)                                                        | ... | ...        | ... | ...    | 5,167    |
| 4 Three feet culverts in approaches                                                                | ... | ...        | ... | ...    | 800      |
| 39 Miles of distributary, at Rs. 1,300 per mile, for 85 miles of irrigation allowing for the canal | ... | ...        | ... | ...    | 50,700   |
| 24 Miles of Canal supplied with modules, at Rs. 400                                                | ... | ...        | ... | ...    | 9,600    |
| 1 First and 2 Second Class Chowkees and 1 Overseer's residence                                     |     |            |     |        | 6,225    |
|                                                                                                    |     |            |     |        | 1,55,577 |
| Establishment at 12½ per cent.                                                                     | ... | ...        | ... | ...    | 19,447   |
|                                                                                                    |     |            |     |        | 1,75,024 |
| Add 30 per cent. as before                                                                         | ... | ...        | ... | ...    | 46,673   |
| Total cost                                                                                         | ... | ...        | Rs. |        | 2,21,697 |

*Junmoor Branch (r).*

Length 6½ miles; width at bottom 5 feet; depth of water 1½ feet; fall per mile 2 feet; discharge 15 cubic feet per second.

|                                                  |     |     |     |     |              |
|--------------------------------------------------|-----|-----|-----|-----|--------------|
| mile 2 feet; discharge 15 cubic feet per second. |     |     |     |     | Rs.          |
| Land, at Rs. 102 per mile ...                    | ... | ... | ... | ... | 663          |
| Plantations ...                                  | ... | ... | ... | ... | 110          |
| Roads and fences, at Rs. 150                     | ... | ... | ... | ... | 975          |
| Excavation ...                                   | ... | ... | ... | ... | 3,171        |
| 2 Falls of 7 feet water-way at tail              | }   | ... | ... | ... | 5,000        |
| 3 Falls in canal ditto                           |     | ... | ... | ... |              |
| 3 Mills at Rs. 1,300                             |     | ... | ... | ... | 3,900        |
| 1 Bridge, Class X, with Regulator                | ..  | ... | ... | ... | 1,599        |
| (No distributary required.)                      |     |     |     |     |              |
| Modules for 6½ miles of canal, at Rs. 400        | ... | ... | ... | ... | 2,600        |
|                                                  |     |     |     |     | <hr/> 18,015 |
| Establishment at 12½ per cent.                   | ... | ... | ... | ... | 2,252        |
|                                                  |     |     |     |     | <hr/> 20,267 |
| Add 30 per cent. as before                       | ... | ... | ... | ... | 5,404        |
|                                                  |     |     |     |     | <hr/> 25,671 |
| Total cost ... Rs.                               |     |     |     |     | 25,671       |

*Khurona Branch (s)*

Length 16 miles to tail escape; width at bottom  $10\frac{1}{2}$  feet; depth of water  $2\frac{1}{2}$  feet, fall per mile 2 feet, discharge 71 cubic feet per second

|                                                                                                                              | Rs.      |
|------------------------------------------------------------------------------------------------------------------------------|----------|
| Land, 16 miles, at Rs. 166 per mile .. ...                                                                                   | 2,656    |
| Plantations .. ...                                                                                                           | 413      |
| Roads and fences, at Rs 150 .. ...                                                                                           | 2,400    |
| Excavation .. ...                                                                                                            | 15,745   |
| 7 Falls (2 at tail escape), 20 feet water way .                                                                              | 28,000   |
| 1 Bridge, Class VIII, with Regulator                                                                                         | 2,867    |
| 2 Three feet culverts in approaches , ...                                                                                    | 400      |
| 5 Sets of mills, at Rs 1,300 ..                                                                                              | 6,500    |
| 46 Miles of distributary, at Rs. 1,300 per mile, for $9\frac{1}{2}$ square miles of area, allowing for the 16 miles of canal | 62,400   |
| 16 Miles of canal supplied with modules, at Rs 400 ..                                                                        | 6,400    |
| 1 First and 1 Second Class Chocee .                                                                                          | 2,800    |
|                                                                                                                              | <hr/>    |
|                                                                                                                              | 1,30,611 |
| Establishment at $12\frac{1}{2}$ per cent ..                                                                                 | 10,326   |
|                                                                                                                              | <hr/>    |
|                                                                                                                              | 1,40,937 |
| Add 30 per cent as before .. .                                                                                               | 30,183   |
|                                                                                                                              | <hr/>    |
| Total cost, .. Rs                                                                                                            | 1,63,120 |

*Achore Branch (t).*

Length  $5\frac{1}{2}$  miles, width at bottom 5 feet, depth of water  $1\frac{1}{2}$  feet, fall per mile 2 feet, discharge 15 cubic feet per second.

|                                                                            | Rs.    |
|----------------------------------------------------------------------------|--------|
| Land, $5\frac{1}{2}$ miles, at Rs 102 per mile ..                          | 561    |
| Plantations .. .                                                           | 93     |
| Roads and fences, at Rs 150 .                                              | 825    |
| Excavation ...                                                             | 2,683  |
| 2 Falls, 7 feet water way at tail } .. .. .                                | 4,000  |
| 2 Ditto ditto on canal }                                                   |        |
| 2 Mills, at Rs 1,300 .. ..                                                 | 2,600  |
| 1 Bridge, Class X., with Regulator                                         | 1,507  |
| 2 Three feet culverts in approaches .. .                                   | 400    |
| (No distributary needed.)                                                  |        |
| $5\frac{1}{2}$ Miles of canal supplied with modules, at Rs. 400 per mile . | 2 200  |
|                                                                            | <hr/>  |
|                                                                            | 11,959 |
| Establishment at $12\frac{1}{2}$ per cent.                                 | 1,869  |
|                                                                            | <hr/>  |
|                                                                            | 10,828 |
| Add 30 per cent. as before ...                                             | 4,188  |
|                                                                            | <hr/>  |
| Total cost . Rs                                                            | 21,316 |



*Dadur Branch (u).*

Length 12 miles; width at bottom 7 feet; depth of water  $1\frac{1}{2}$  feet; fall per mile 2 feet; discharge 33 feet per second.

|                                                                                                                            | Rs.    |
|----------------------------------------------------------------------------------------------------------------------------|--------|
| Land, 12 miles, at Rs. 127½ per mile ... ..                                                                                | 1,530  |
| Plantations ... ..                                                                                                         | 255    |
| Roads and fences, at Rs. 150 ... ..                                                                                        | 1,800  |
| Excavation ... ..                                                                                                          | 6,918  |
| 2 Falls, 10 feet water-way at tail } ... ..                                                                                | 12,000 |
| 4 Ditto on canal ... ..                                                                                                    |        |
| 1 Bridge, Class IX., with Regulator ... ..                                                                                 | 2,065  |
| 2 Three feet culverts in approaches ... ..                                                                                 | 400    |
| 4 Mills, at Rs. 1,300 ... ..                                                                                               | 5,200  |
| 20 Miles of distributary, at Rs. 1,300 per mile, for 44 square miles of irrigation allowing for the length of canal ... .. | 26,000 |
| 12 Miles of canal provided with modules, at Rs. 400 ... ..                                                                 | 4,800  |
| 1 First and 1 Second Class Chokey, and 1 Overseer's residence ... ..                                                       | 5,425  |
|                                                                                                                            | <hr/>  |
|                                                                                                                            | 66,393 |
| Establishment at 12½ per cent.... ... ..                                                                                   | 8,299  |
|                                                                                                                            | <hr/>  |
|                                                                                                                            | 74,692 |
| Add 30 per cent. as before ... ..                                                                                          | 19,917 |
|                                                                                                                            | <hr/>  |
| Total cost ... Rs.                                                                                                         | 94,609 |
|                                                                                                                            | <hr/>  |

*Humeednuggur Branch (v).*

Length  $15\frac{1}{2}$  miles; width at bottom 10 feet; depth of water  $2\frac{1}{2}$  feet; fall per mile 2 feet; discharge 64 cubic feet per second.

|                                                                                                                         | Rs.      |
|-------------------------------------------------------------------------------------------------------------------------|----------|
| Land, $15\frac{1}{2}$ miles, at Rs. 166 per mile ... ..                                                                 | 2,573    |
| Plantations ... ..                                                                                                      | 429      |
| Roads and fences, at Rs. 150 ... ..                                                                                     | 2,325    |
| Excavation ... ..                                                                                                       | 15,038   |
| 2 Falls, 15 feet water-way at tail } ... ..                                                                             | 21,000   |
| 5 Ditto on canal ... ..                                                                                                 |          |
| 1 Bridge, Class VIII., with-Regulator ... ..                                                                            | 2,867    |
| 2 Three feet culverts in approaches ... ..                                                                              | 400      |
| 5 Mills, at Rs. 1,300 ... ..                                                                                            | 6,500    |
| 42 Miles of distributary, at Rs. 1,300 per mile, for 85 square miles of irrigation, allowing for length of canal ... .. | 54,600   |
|                                                                                                                         | <hr/>    |
| Carried over...                                                                                                         | 1,05,732 |

## GENERAL ESTIMATE

clxxx1

Brought forward

|                                                               |             |
|---------------------------------------------------------------|-------------|
| 15½ Miles of canal supplied with modules, at Rs 400           | 6 200       |
| 1 First and 1 Second Class Chokee, and 1 Overseer's residence | 5 425       |
|                                                               | 1,17 357    |
| Establishment at 12½ per cent                                 | 14 669      |
|                                                               | 1 52 026    |
| Add 30 per cent as before                                     | 35 209      |
| Total cost                                                    | Rs 1,67 233 |

*Kulangee Branch (w)*

|                                                                                                                                    |             |
|------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Length 15 miles, width at bottom 9½ feet, depth of water 2 feet, fall per mile 2 feet, discharge 58 cubic feet per second          | Rs          |
| Land, 15 miles, at Rs 166 per mile                                                                                                 | 2 490       |
| Plantations                                                                                                                        | 415         |
| Roads and fences at Rs 150                                                                                                         | 2 250       |
| Excavation                                                                                                                         | 14,137      |
| 2 Falls, 15 feet water way at tail }                                                                                               | 30 000      |
| 8 Falls on canal }                                                                                                                 |             |
| 1 Bridge, Class VIII, with Regulator                                                                                               | 2 867       |
| 2 Three feet culverts in approaches                                                                                                | 400         |
| 4 Mills, at Rs 1 300                                                                                                               | 5,200       |
| 42 Miles of distributary, at Rs 1,300 per mile for 76½ square miles of area to be irrigated, allowing 15 miles per length of canal | 46 800      |
| 15 Miles of canal supplied with modules, at Rs 400                                                                                 | 6 000       |
| 1 First and 1 Second Class Chokee                                                                                                  | 2 800       |
|                                                                                                                                    | 1 23 359    |
| Establishment at 12½ per cent                                                                                                      | 14 169      |
|                                                                                                                                    | 1 27 528    |
| Add 30 per cent. as before                                                                                                         | 34,008      |
| Total cost                                                                                                                         | Rs 1 61 536 |

## NAVIGATION LINES

*I : Line from the Dinapore Branch Head to Patna*

|                                                                                                                                    |          |
|------------------------------------------------------------------------------------------------------------------------------------|----------|
| Length 27 miles, width at bottom 20 feet; depth of water 3½ feet, fall per mile 1 inch, discharge theoretically 63 feet per second | Rs.      |
| Land, at Rs 231 per mile                                                                                                           | 6 237    |
| Plantations                                                                                                                        | 1 039    |
| Roads and fences, at R 250 per mile                                                                                                | 6 750    |
| Excavation                                                                                                                         | 52,096   |
| 4 Single locks 120 x 16 with waste weir, one at head, at Rs 27,500                                                                 | 1,10,600 |
| 9 Bridges, Class VI, at Rs. 8 000                                                                                                  | 72 000   |
| 1 First and 3 Second Class Chokees, and 1 Overseer's residence                                                                     | 7,025    |
|                                                                                                                                    | 2,55 117 |
| Establishment at 12½ per cent                                                                                                      | 31,893   |
|                                                                                                                                    | 2,87 010 |
| 30 per cent. added as before                                                                                                       | 76 541   |



ES.

| Distinguishing letters. |    | First Total. | Establishment at 12%<br>per cent | Second Total | 30 per cent to cover<br>cost of probable<br>rise of prices | GRAND TOTAL |
|-------------------------|----|--------------|----------------------------------|--------------|------------------------------------------------------------|-------------|
| B                       | Ar | 9,70,552     | 1,21,319                         | 10,91,871    | 2,91,166                                                   | 13,83,037   |
| C                       | Di | 2,55,391     | 31,923                           | 2,87,314     | 76,617                                                     | 3,63,931    |
| D                       | Di | 3,45,326     | 43,165                           | 3,88,491     | 1,03,598                                                   | 4,92,089    |
| E                       | Di | 4,94,976     | 61,872                           | 5,56,848     | 1,48,493                                                   | 7,05,341    |
| F                       | N  | 87,160       | 10,895                           | 98,055       | 26,148                                                     | 1,24,203    |
| G                       | Pe | 1,87,583     | 23,448                           | 2,11,031     | 56,274                                                     | 2,67,305    |
| H                       | Di | 1,63,886     | 20,486                           | 1,84,372     | 49,166                                                     | 2,33,538    |
| I                       | Ju | 1,85,199     | 20,687                           | 1,88,186     | 49,619                                                     | 2,35,805    |
| J                       | R  | 2,31,289     | 28,911                           | 2,60,200     | 69,387                                                     | 3,29,587    |
| K                       | Di | 1,74,021     | 21,752                           | 1,95,773     | 52,206                                                     | 2,47,979    |
|                         |    | 30,75,983    | 3,84,498                         | 34,60,481    | 9,22,795                                                   | 43,83,276   |